# Better Crops with PLANT FOOD

March 1940 10 Cents

The Pocket Book of Agriculture

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**AMERICAN POTASH INSTITUTE, INC.**
**INVESTMENT BUILDING** **WASHINGTON, D. C.**

# Better Crops with PLANT FOOD

The Whole Truth—Not Selected Truth

R. H. STINCHFIELD, *Editor*

J. D. ROMAINE, *Chief Agronomist*

*Editorial Office:* Investment Bldg., Washington, D. C.

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WINTER LINGERS LONGER IN SPOTS LIKE THIS

Better Crops with PLANT FOOD

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VOL. XXIV WASHINGTON, D. C., MARCH 1940 No. 3

*A requisition for more—*

# First-Aid Squads

Jeff McDermid

IN THE popular wake of all this furor over our coastal defenses and faster bombers and bigger navies, let us raise a voice in behalf of the much-neglected home community first-aid squad—what there is of it! More luckless persons pass out accidentally every year in their own quiet neighborhoods than we might lose by an ordinary siege or invasion. They are the hapless victims of blundering attention, misplaced zeal, excited friends, and a ravaging host of strep and tetanus germs lurking amid the litter of harmless bucolic barn-yards.

March is a significant period in which to introduce this succoring subject to the influential county and local leaders who please us by admitting they peruse our pages. If we lacked such an attentive and helpful clientele, our opportunity for service and satisfaction would indeed be slight. That's why we rush to you with sudden hunches, knowing you will be frank to a fault in praise or blame.

March is the last month in which to get the gang together before they start ordering spring supplies and begin to itch for a fling at the fertilizer pile. But if we postpone the mobilization of our proposed safety squads until the busy agronomists are far afield, we shall be hip-deep in accidents and resulting hysteria once more 'ere we have the trained personnel to meet it with prudent preparedness.

Therefore, let us broach the cask of caution with the mallet of argument.

What in Sam Hill is the good of having local soil conservation committees, and P. T. A.'s, and town party caucuses, and snoopers and sundry inspectors, et cetera, while we expect one overworked country doctor, a far-off county nurse, and the almanac that ought-to-be-on-the-nail to protect us from bacteria infection, suffocation, cuts, fractures, beans in the nose, and kerosene for fire lighting? That was a long sentence to be sure, but not so long as it would take a victim to wait for a good first-aid troop in my community. Or yours either.

To be sure, there are no signs as yet of any heated campaign platforms aimed at saving us rubes from our own buzz-saws and shootin' irons, or to direct us not to lift and stuff every injured and unconscious guy into a bus to tote him to the doctor—instead of keeping him flat and warm while we send for the right assistance. Certainly, I fully sense the fact that this safety issue is not as germane to the year 1940 and the glorious debates on the stump as "reciprocal trades" and parity payments; and I agree that you are not apt to get red in the face hollering about it.

IT'S just one of those movements that look good on paper, make a great street sign for the Kiwanis or Rotary boys to set up somewhere on the outskirts, but which takes a vast amount of strict detail and no end of personal bother to perfect. Naturally it takes on two distinct phases—prevention of needless stumbling, tripping, gashing, and bruising—and emergency action by well-trained people on the spot marked X before the doctor arrives.

There is still another division of the topic, that of locale. Deaths and serious injuries annually occur to a great extent on the highways, and to a lesser degree in schools, rural homes, and on isolated farms. As far as the highway situation is concerned, many States have trained patrolmen and scouts, as well as first-aid stations, designed to handle many such incidents with care and dispatch. But these are largely on the main concrete causeways, and our rural by-ways and lanes are unguarded. So likewise are most of our farmsteads where modern machinery, electric current, steam, gasoline, and belted contraptions raise the risk and hasten the hazard; and where the same old natural causes like lightning and tornado outwit the slickest of preventives.

I AM glad to pause here and report with solemnity and no little satisfaction that the conservative dairyman has abandoned one of his stubborn ideas, much to the welfare of himself and his family. Yon proud and self-reliant dairyman of my youth scorned using a staff and a nose-ring for Sir Johanna Ormsby Oxford Masterpiece, and he stabled the monster in a crypt right alongside the gentler bovines. He took him out to parade before company, he posed him for countless smudgy pictures, and he always thought of him as though he were a cute little calf, romping with his dam in the starry meadows.

After he woke up from the chloroform and bought him a crutch, this enlightened dairyman handed on sage advice to his sons, or else cut it deep into his tomb for all to behold and beware. Hence cement contractors eke a hearty living in the milk zones now building steel and concrete parade grounds, wherein the bull peers forth as Exhibit Number One in accident prevention on the farm.

HAVING disposed temporarily and rather universally of Enemy Number One in rural foolishness and neglect, and probably saved as many lives as we have reformed bull-owners, where do we go from here? My idea about this is to tackle the next living anti-sanity gent who threatens the peace of the community, as well as his own skin. I refer to the Tough Guy. He is found on every hand and nearly any rural neighborhood reveals him in all his granite-like glory.

Last fall while rounding up a corn-husking bee I ran into one of those Nerveless Wonders, superman paramount. He had just cut every knuckle on both fists in a silo filler mechanism, and was running around dripping gore and giving orders to the hired men to hustle up more corn shocks. When reminded ruefully by one of us that his paddies needed patching, this throwback from the cavemen snorted and waved us off with a gashed gesture. "This little scratch ain't nothin'. I'll slap a chew of tobacco on it and finish the harvest full o' pep." Unfortunately I cannot recite any obituary to prove my point this time, but all I can say is he lived in spite of his hardihood, and he set a poor example to his children.

Yet I have been pallbearer to several just such chaps as he, men who scoffed at injuries and wanted the world to observe their manly endurance. I guess they fed up on Injun torture yarns when they were kids, or had grandfathers who slightly overestimated their valor and stamina during the civil war. Somehow they confused courage with foolhardiness and imagined that anyone who went bugs over bacteria was a namby-pamby weakling.

Maybe it's going to be hard to reach and reform those who are deliberately dumb and insistently indifferent. On the other hand, maybe I don't want to. Maybe we'd be better off if they all kicked the bucket and made room for the cautious and conservative tribesmen. It won't stop me organizing anyhow. It's because I got a cause.

One of the dumbest performances, and yet one of the saddest because it affects the gentler sex most often, relates to the w. k. kerosene can. When I was in my teens Dad showed me how to soak cobs in a shallow tin can full of coal oil. These I was taught to stow away in the corner far from the fire, and on cold mornings it was my duty to stack these oil-soaked cobs in the ashes of the cook-stove and toss a match on them to kindle the blaze. But not so the neighbor lady. She dashes a stream of live kerosene right into the stove and becomes a warning torch that never warns! She was the same one that used a hairpin on every major operation from boils on the nether parts to beans up baby's nostril.

HER second cousin was the gent who left the rusty rake lying loose in the yard and smashed his nose and a ten-dollar pair of bi-focals by slap stepping on it. The uncle of that specimen slashed his shin with a draw-shave and did not believe in tetanus anti-toxin until he began frothing. He in turn was a half-brother to the foster father of the one who told the boys to let the drowned man lie because there wasn't any barrel to roll him on. And so on, my wide and varied acquaintance runs, in and out amid the slums of ignorant indifference, revealing how little we value our domestic defenses.

Surveys to detect, list, and recommend removal of accident hazards on farms and in rural households might be worth a 4-H project. I recall a few years back when agents of a fire insurance mutual in my section sent out persons to inspect such premises respecting fire hazards. The only danger in this work by proxy lies in arousing native suspicion that the visitors are just ordinary nosey snoopers. It would no

(*Turn to page* 46)

*When Fertilizing*

# Consider Plant-food Content of Crops

*By J. D. Romaine*

Washington, D. C.

THE plant foods contained in crops have been investigated more or less systematically by agricultural chemists for many years. Interest in having the results of these investigations compiled for ready reference has increased markedly within the last several years, probably largely due to the agricultural conservation programs of the Government. Under the soil conservation work, crops are designated as soil conserving and soil depleting. The question has come up as to whether the plant-food content of the crops has a bearing on the classification.

Reduced yield and quality of crops, and the widespread increase in abnormalities and diseases of crops that have been identified as nutrient deficiency symptoms, also are bringing home to farmers the fact that the soils of North America are becoming depleted of their fertility. It is gradually becoming realized that fertilizers will have to be applied to soils once thought to be inexhaustibly fertile if satisfactory crop yield and quality are to be obtained. When considering the reasons for this depletion, and the use of fertilizers on the various plants grown, the amounts of plant foods contained in crops have been frequently questioned.

To supply this information, data from numerous sources have been compiled to give the nitrogen (N), phosphoric acid ($P_2O_5$), and potash ($K_2O$) contained in good yields of important representative crops, (Table I). The figures give amounts in the entire plant, and where of practical importance, in the harvested and any unharvested part of the crop. Total figures do not include roots unless they are harvested.

From the table, it is to be noted that crops of celery, potatoes, tomatoes, and sugar beets all contain high amounts of plant foods. Oranges, sweet potatoes, tobacco, cabbage, peaches, and corn also use considerable quantities. Most of these crops are rather intensively grown, and it is not particularly surprising that they feed heavily upon the soil. Rather startling, however, are the large removals by the legume crops such as alfalfa, lespedeza, soy beans, red clover, and peanuts. With the exception of peanuts, these are known as soil-conserving or soil-building crops. It is obvious that unless these crops are turned under as green manures they are by no means soil building, but highly soil depleting. When they are cut for hay or pastured, there is a heavy drain on the minerals in the soil, such as phosphoric acid and potash. The nitrogen in the crops comes mostly from the air, and so is not a loss when the crop is harvested. Even when the crops are turned under, the soil is enriched only in organic matter and nitrogen, the phosphoric acid and potash being the same unless they are added to the soil.

Practical demonstration of the depletion of potash by legumes when they are removed from the soil may be seen in the recent publication of the Alabama Experiment Station in which it

was shown that when peanuts are grown in the rotation, more potash must be used on cotton. The increased amount of cotton rust, which is really potash starvation, following legumes also is indication that these crops deplete the potash in the soil.

This does not mean that legumes are not good crops to grow, or that they are unduly hard on the soil. Properly handled and fertilized, they are very beneficial, giving high quality feed, and improving the nitrogen and organic matter or humus supply of the soil. Their value is shown by the fact that when they are grown in the rotation, and proper amounts of phosphate and potash applied to them and other crops, the yields of all crops in the rotation will be higher than if the legumes are not grown.

### Plant-food Available

Breaking down the data into the parts of the plant, permits using the table to determine total nutrients needed and the nutrients removed from the soil when the crop is harvested. Where practically the entire crop is harvested and removed from the soil there is no need to break down the figures.

**For a growth like this, large quantities of plant food must be available in the soil.**

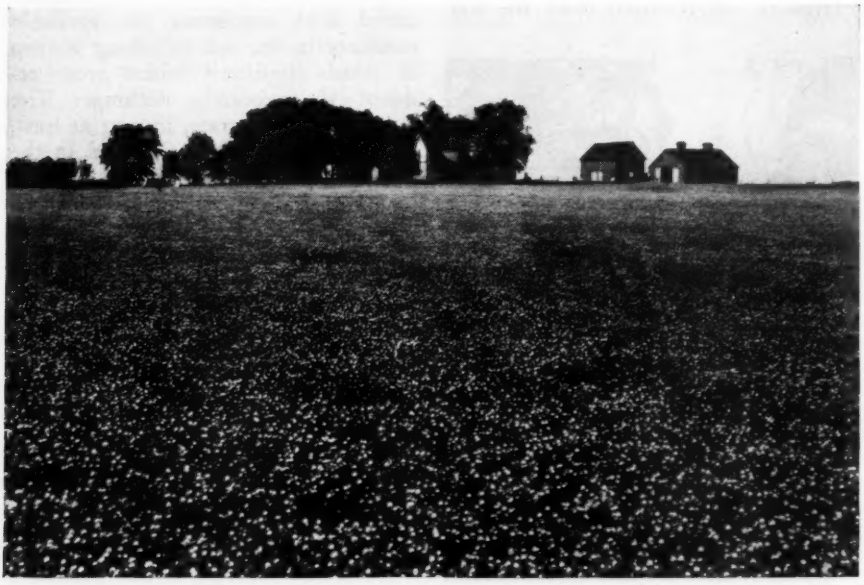
When discussing data of this nature, some prefer to consider only the nutrients removed from the soil in the harvested crop. While this is important, it is equally important to know how much of the nutrients must be available to the crop if a good yield is to be obtained. For example, a 60-bushel crop of corn removes about 100 pounds of the three main nutrients in the grain and cobs, but an equal amount is contained in the stover, and this must be available to the crop if a full yield is to be obtained. The same applies in varying proportions to many other crops.

Moreover, the nutrients contained in the whole plant frequently are removed from the field, and these figures represent removal from the soil so far as the next crop is concerned. The straw, tops, and other parts of the plant not considered as a principal part of the crop may be returned to the soil as manure later in the rotation, but the following crop does not have the nutrients contained therein for its use. Cases have been noted where under actual field conditions the available nutrients in the soil following a crop of poorly fertilized wheat were reduced to practically nothing. The nutrients in the straw, in part at least, would be returned to the field in the manure later in the rotation, but the hay crop immediately following the wheat suffered greatly from a lack of potash. In the case of many vegetable crops, the tops or vines may be removed from the soil and largely lost. Care should be taken to keep these losses as low as possible, but they are almost sure to occur to some extent.

Considering the individual nutrient content, it will be observed that in general, the nitrogen and potash are much higher than the phosphoric acid. The legumes are the highest in nitrogen, followed by potatoes and sugar beets. Celery is the highest potash-using crop, followed by alfalfa, the root crops, vegetable crops, tobacco, oranges,

**In the grain and straw of heavy harvests, large amounts of nutrients are taken from the soil.**

and peaches. Celery, soy beans, and sugar beets use the most phosphoric acid. The division of the nutrients within the parts of the crop or plant shows that nitrogen and phosphoric acid tend to be high in the seed parts, while potash is high in the stalk parts or roots. Some exceptions to these generalities will be seen, especially in soy beans and sugar beets.



**Legumes are called soil-building crops because they can fix nitrogen from the air. However, they draw heavily on the phosphate and potash in the soil.**

PLANT-FOOD UTILIZATION
AMOUNTS IN POUNDS CONTAINED IN TOTAL PLANT WITH GOOD ACRE YIELDS
N Nitrogen
$P_2O_5$ Phosphoric Acid
$K_2O$ Potash
CORN 60 bu.
WHEAT 30 bu.
COTTON 1 bale 500 lb. lint
TOBACCO 1500 lb. leaf
SUGAR BEETS 15 tons
CABBAGE 15 tons
SWEET POTATOES 300 bu.
TOMATOES 10 tons or 375 bu.
IRISH POTATOES 300 Bu. or 180 Sacks
CELERY 350 crates
ALFALFA 3 tons
SOY BEANS 25 bu.
RED CLOVER 2 tons
LESPEDEZA 3 tons
PEANUTS 1 ton nuts
TIMOTHY 1½ tons
APPLES 400 bu.
PEACHES 500 bu.
GRAPES 4 tons
ORANGES
LEGUMES CAN OBTAIN THE GREATER PART OF THEIR NITROGEN FROM THE AIR
AMERICAN POTASH INSTITUTE, INC.
WASHINGTON, D.C.

The practical application of these figures is of great importance in fertilizer usage. It is common knowledge among farmers that different crops growing on the same soil must be fertilized differently for best results. There are a number of reasons for this, the principal agronomic ones being variation in plant-food content of the plants and in the feeding power of the plant for the nutrients in the soil. The value of the crop also is an important factor, but cannot be given more than general consideration in this article.

If only the nutrients contained in the crop had to be given consideration in determining the fertilizer to use, the

(*Turn to page* 37)

# The Hills and Valleys of Phosphate Fixation

*By George D. Scarseth*

Soil Chemist, Purdue Agricultural Experiment Station, Lafayette, Indiana

¶ *Second of a series of practical articles dealing with the principles of soil fertility.*

*WHY Worry About Available Phosphate?* No person would be satisfied to deposit $10 in a bank that would only allow $2 or $3 to be withdrawn. Yet, we are not greatly concerned when plants can use only 20 to 30 per cent of the phosphate added to soils in an available form in fertilizers. The balance of the phosphate becomes locked up in the soil so tightly that nature actually uses this fact in accumulating the phosphate ore deposits of the world. The phosphate minerals are so much more insoluble than the other minerals in the original rocky parent material, that the phosphate minerals are left behind as residues when many of the other rock minerals have weathered away through the thousands of passing years.

Since soils have the peculiarity of wasting phosphorus by locking or fixing soluble phosphates into unavailable forms, we like to know what can be done about releasing it. In order to know what can be done to decrease fixation, it is necessary to understand the mechanism by which the fixation takes place.

*Where Are Phosphates Locked Up in the Soil?* If a soil were pure sand and contained no clay particles, there would be no fixation of soluble phosphates, because the fixation takes place only in the clay part of the soil. This means that the heavy clay soils will tie up phosphates faster and to a greater extent than light-textured soils. This also means that phosphate-carrying fertilizers will go farther and last longer in sands than in clays. However, since most soils contain from 20 to 30 per cent of clay, the behavior of the clay towards the phosphates becomes very important.

*The Behavior of Phosphates in Soils.* Much research has been done to learn how phosphates behave in soils. The diagram sums up the most important relationships that exist between the complexities in the clays of the soil and phosphates as affected by the different degrees of acidity in the soil. (The acidity is expressed in terms of pH.)

The diagram is made up of actual experimental curves that express definite relationships. To understand these curves best, think of them as hills that overlap one another as shown in the figure, with valleys formed in the spaces where the hills fail to overlap. The higher the hill the greater the fixation capacity, and the lower the hill, or deeper the valleys, the less the relative fixation. The diagram needs to be studied carefully and is then self-explanatory.

*Phosphates Can Be Made More Available in Soils.* It is obvious that the phosphate has the best chance to be of the highest availability in the soil at the slightly acidic reaction of pH 6.5. This is one of the reasons why it is so important to correct strong acidity by liming the soil.

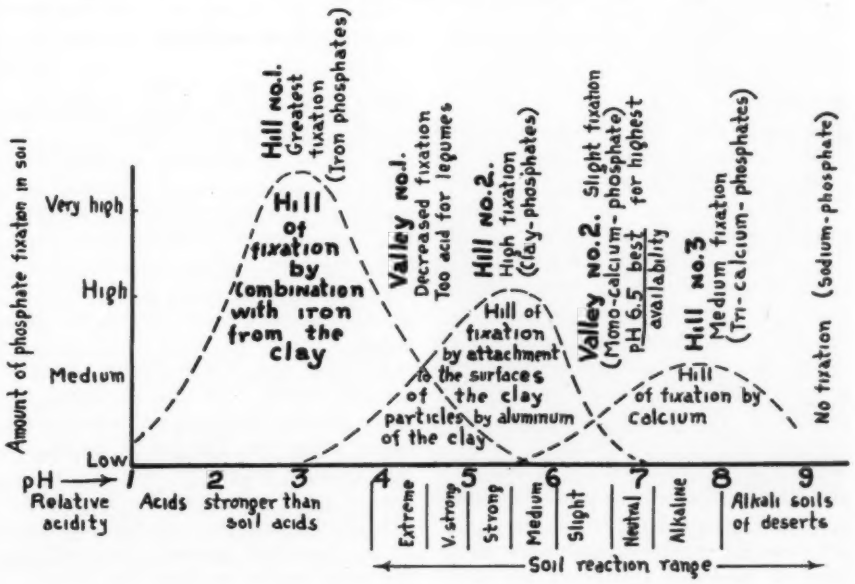
The phosphates that are fixed, as shown in "Hill No. 2" of the diagram,

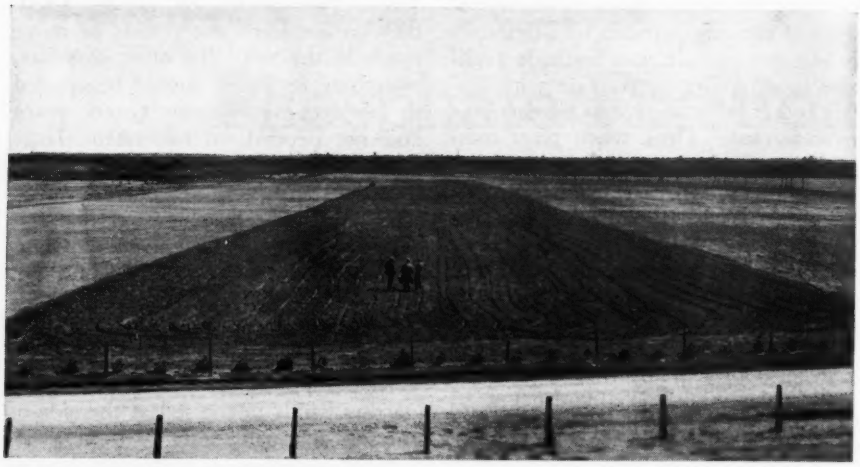
by being fastened (adsorbed) to the surfaces of the clay particles by aluminum in the clay particle, can be made available by an exchange reaction with certain other substances, as humate-ions from humus. Thus, when plant matter decomposes to form humus in the soil, the humate part of the organic matter will push the fixed phosphate-ion off the clay and leave it in an available form. The humate-ion will attach itself to the clay where the phosphate-ion had been fixed. In this manner, organic matter favors the more favorable behavior of phosphates in soils that are acid between pH 5.0 and 6.0

Organic matter will cause "Hill No. 3" to be lowered by the action of carbon dioxide ($CO_2$) that is given off by the bacteria when rotting the organic matter. The $CO_2$ thus formed is a weak acid (carbonic acid, which is the same as carbonated water in the soda fountain) which acts upon the fixed tri-calcium phosphates of "Hill No. 3" to convert the phosphate into forms available to plants. (Roots give off $CO_2$ that dissolves also some of the tri-calcium phosphates.) This action of $CO_2$ does not help much in the acid ranges below pH 6.0.

Since phosphates are rapidly fixed, they do not leach out readily or move much in the soil. To offset this fact, phosphate fertilizers should be applied in frequent applications (every year) and not depend on infrequent, large applications to supply the phosphate needs of the plants for 3 or more years. The available phosphate-carrying fertilizers should not be mixed too thoroughly into the soil, since thorough mixing increases the contact between the phosphates and the fixation-components in the soil. Adding the available phosphates (superphosphate) in narrow bands in the soil at the side of the seed is usually best.

Rock phosphate is frequently used as a source of phosphate. Its availability depends upon many factors. In general this form of phosphate works best (1) when added in large amounts to soils that are slightly acid (pH 6.0) and mixed throughout the soil; (2) with rotations containing legumes adequately fertilized with potash. If rock phosphate is used to favor legumes in the rotation, superphosphate should still be used in the mixed fertilizers for wheat, corn, and other row crops.


Amount of phosphate fixation in soil
Very high
High
Medium
Low
Hill No.1. Greatest fixation (Iron phosphates)
Hill of fixation by combination with iron from the clay
Valley No.1. Decreased fixation Too acid for legumes
Hill No.2. High fixation (Clay-phosphates)
Hill of fixation by attachment to the surfaces of the clay particles by aluminum of the clay
Valley No.2. Slight fixation (Mono-calcium-phosphate) pH 6.5 best for highest availability
Hill No.3 Medium fixation (Tri-calcium-phosphates)
Hill of fixation by calcium
No fixation (Sodium-phosphate)
pH
1 2 3 4 5 6 7 8 9
Relative acidity
Acids stronger than soil acids
Extreme
V. strong
Strong
Medium
Slight
Neutral
Alkaline
Alkali soils of deserts
Soil reaction range



**This 75-acre field on the farm of Romeo Godbout, St. Thomas, Quebec, is being prepared for flue tobacco.**

# Fertilizing Tobacco For More Profit

*By J. E. Montreuil*

Superintendent, Agricultural Experiment Station, L'Assomption, Quebec, Canada

BECAUSE of a slight increase in the prices of fertilizers, some farmers are thinking with apprehension of the purchases which must be made for their 1940 crops. When the prices of farm products are likely to be better, there is no justification for a reduction in the use of fertilizers because of a moderate price increase brought about by war. It has been well proven, both in this immediate district and in many regions elsewhere, that well-chosen chemical fertilizers are a necessary complement of barnyard manure.

The proper combination of manure and fertilizers not only produces more and better crops, but permits the available manure to be spread over more land at moderate quantities per acre. After all, this is the most sensible and economical practice to follow.

If the use of adequate amounts and suitable combinations of chemical fertilizers is a paying proposition for general farm crops, we may consider it even more essential for the economical production of good tobacco crops, whether grown for pipe, cigar binder, or cigarettes.

Here at the L'Assomption Experimental Station, and also on many tobacco growers' farms, it has been proven many times that the use of fertilizers plus manure lowers the cost of production of cigar tobacco. We have often published figures proving this, and most of the successful growers can testify to the same results on their own farms.

This is easy to understand. Tobacco is a fast-growing plant; it must find its nourishment in the soil in sufficient quantity and availability to stimulate its growth. Tobacco is very sensitive, probably more so than most crops, to the composition of the plant food at its disposal. Nitrogen, phosphoric acid, and potash, to speak only of the major elements, must be supplied in well-defined ratios; if not, yield and quality of the crop certainly will be jeopardized.

### Manure Not Enough

The composition of manure does not vary much and lacks balance for the needs of the tobacco plant. Moreover, to become available to the tobacco plant, manure in the soil must undergo certain transformations, which are especially slow in the spring and early summer when the soil is not warm enough to facilitate the development and work of the micro-organisms responsible for these changes.

This explains why plantations treated with manure only are slow to start, and in normal years, always yield less than those treated with manure supplemented by proper chemical fertilizers. On the other hand, what is said here of the necessity of using a well-balanced fertilizer for the production of good crops of tobacco applies just as well to other crops.

For some farmers the modifications occasionally made in the formulae of chemical fertilizers are indications that their efficiency and economy have not been proven. That there are no perfect formulae is admitted. There probably will never be any. Formulae recommended will be changed from time to time with an increased knowledge of plant requirements, of the reaction of fertilizers in the soil and between themselves, and also of the composition and depletion of soils.

The formulae which we have recommended during the past 10 or 12 years have not varied much, except for potash, and we admit without shame that up to a few years ago the mixtures we recommended were too low in this element.

Let us summarize the quantities of nutrients required by an acre of a fair crop of binder cigar tobacco.

*Nitrogen.* This is the element that produces a heavy crop. Unfortunately an excess of it gives plants too coarse a structure, slow maturation, poor drying and burning quality. Cigar tobacco requires soils well provided with humus, but without a surplus of readily available nitrogen while the plant is maturing. In the past, probably too much nitrogenous fertilizer has been used. Experimental work shows that on soils giving an average length of maturity, the rate of application of nitrogen should not exceed 160 lb. per acre. It seems also well proven that at least 30 to 40 per cent of the nitrogen should be supplied in the organic form.

Cottonseed meal is an excellent source of organic nitrogen, probably the one that has been most recommended and most extensively used on farms where tobacco is exclusively grown. This is often used together with castor bean oil meal, soybean, and even linseed oil meals. All these seed oil meals are ex-

**Showing a variety of large pipe tobacco known as "Grand Rouge." This tobacco belongs to the Havana type.**

pensive, and barnyard manure can replace them as the source of the organic nitrogen. At any rate, this is what the results of a 3-year experiment seem to prove.

As a source of inorganic nitrogen, nitrate of soda and sulphate of ammonia are the most commonly used. The latter costs less, but used in very large amounts probably decreases the burning quality of tobacco. This is why inorganic nitrogen is generally supplied, half in the form of nitrate of soda and half in the form of sulphate of ammonia. Nitrate of soda, being readily available, stimulates a more rapid growth of the young tobacco plants.

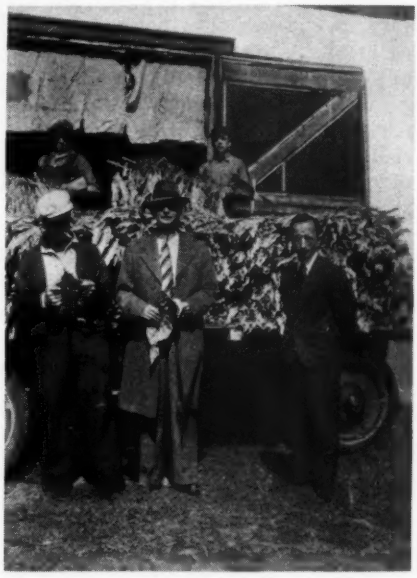
*Phosphoric Acid.* On most of our soils, phosphoric acid will influence the yield of tobacco to the same extent as nitrogen. In a series of experiments where a superphosphate was applied at different rates so as to supply as much as 320 lb. of $P_2O_5$ per acre, the heaviest rates of application have always yielded the heaviest crops. Unfortunately, the quality of tobacco, especially its burning quality, does not follow the same upper trend but decidedly decreases with the heavier application.

In order to get tobacco of good quality, the grower should not apply more than 160 lb. of phosphoric acid per acre. And again, this amount might prove too strong after a few years of growing tobacco on the same soil.

Of all the sources of phosphoric acid that we have tried, none has shown itself superior to the 20% superphosphate.

*Potash.* Potash has been used in quite inadequate quantities by most of our growers, though it is perhaps the element of fertility that pays the highest dividends in tobacco growing. However, some of our farmers who have the reputation of producing excellent tobaccos are convinced of this fact, because each year they purchase a few hundred pounds of sulphate of potash to enrich the ready-mixed fertilizers supplied by the trade. Potash most certainly influences the yield, but still more the quality in general (texture, elasticity, finish of the leaf). But its influence is most marked on the burning quality. Potash seems to act as a tonic and makes plants more resistant to the majority of diseases.

In experiments where we used mineral potash in amounts varying from 27 to 400 lb. per acre, the highest applications always coincided with the best quality crops. However, as yields do not absolutely follow the same upper trend, it might not be profitable to use potash at the rate of 400 lb. per acre, although 230 to 250 lb. would certainly show a profit.



**Mr. Godbout, Jr., Dr. J. W. Turrentine, and Mr. Montreuil (left to right) inspect a load of flue-cured tobacco on the Godbout farm.**

Potash is usually supplied to the tobacco plant in the form of sulphate of potash. It might be in part replaced by nitrate or carbonate of potash, but these two fertilizers are not always easy to obtain, nor as cheaply procured.

Muriate of potash has a beneficial effect in imparting vigor to the tobacco plant. But it has a most unfavorable effect on the burning quality and should be used in very small quantities and only on soils producing tobacco of ex-

**Binder cigar tobacco growing on a demonstration field at the Experiment Station of L'Assomption.**

cellent burning quality. Even under these conditions muriate of potash should not represent more than one tenth of the total potash applied. As our tobaccos seldom err in an excess of burning quality, it would probably be better that the fertilizers should contain no muriate.

*Magnesia.* It is granted that magnesia has a certain beneficial effect on the combustibility of tobacco and notably on the colour of the ash. Moreover, on sandy soils it is often necessary to use it as a preventive measure for the disease called sand drown. In this case 2 per cent of magnesia (MgO) is used in the chemical fertilizer mixture.

The few experiments we have conducted with magnesia do not seem to indicate that our cigar leaf tobacco soils are deficient in this element. Tobacco grown in the rotation may make use of magnesia less necessary.

We have seen then that an acre of cigar leaf tobacco requires the following major plant-food elements:

140 to 160 lb. of nitrogen of which 30 to 40 per cent should be in organic form.

130 to 160 lb. of phosphoric acid.

200 to 250 lb. of actual potash.

These can be supplied by manure, chemical fertilizers, or a combination of manure and chemical fertilizers.

It is admitted that a ton of well-kept mixed manure contains about 8 to 10 lb. of nitrogen, 5 to 6 lb. of phosphoric acid, and 8 to 10 lb. of potash. For tobacco, this is a poorly balanced fertilizer and explains why heavy applications of manure produce tobaccos of inferior quality and yields to those grown with the addition of chemical fertilizers.

The heaviest crops are generally obtained with chemical fertilizers, but to produce high quality tobacco, these fertilizers should contain—as we saw when dealing with nitrogen—a certain proportion of seed oil (cotton or other kinds) which makes them too costly, except for use on high-priced varieties.

Manure used in combination with mineral fertilizers produces heavy yields of tobacco of excellent quality, and at lower cost than the crops grown with either manure alone or chemical fertilizers alone. The results of 16 experiments show that 10 tons of manure and 1,000 lb. of chemical fertilizers yielded an average of 1,900 lb. of very good tobacco, while 20 tons of manure (without chemical fertilizers) yielded only 1,700 lb. of a distinctly inferior quality.

(*Turn to page* 42)

# Utilizing Cut-overs In Mississippi

*By F. J. Hurst*

Editor, Agricultural Extension Service, State College, Mississippi

A LONG-SOUGHT solution of the perplexing problem, how to develop a sound farming program that would profitably utilize the vast areas of cut-over lands left in the wake of destructive lumbering in the Coastal Plain Counties of southeast Mississippi, apparently has been found by enterprising farmers in Pearl River County. The Coastal Plain area, once covered with virgin forests of stately longleaf yellow pines, which yielded a harvest of gold to a few lumbermen, now promises to become a land of flourishing sugar cane fields, thriving satsuma orange orchards, productive tung oil groves, new pine forests, improved permanent pastures, and profitable livestock enterprises.

Already in Pearl River County, one tung oil crushing plant, three orange-packing sheds, a box factory, a modern syrup plant, a cold storage and meat-curing plant, and a naval stores production plant which is utilizing pine stumps blasted from cleared, cut-over lands have been built and are now operating where once sawmills alone held sway, and lumber was the chief product produced.

The breeding of highly productive varieties of sugar cane resistant to mosaic disease, which once all but wiped out this important crop, mastery of the art of growing satsuma oranges to meet the growing demand for this tasty product, and introduction and development of tung tree culture, to supplement al-

**Harvesting sugar cane on Carl Bass' farm near Picayune, Mississippi. At this stage the leaves have been stripped from the stalks, and the cane, after the tops are cut out, will be sent to a nearby mill.**

ready established farming and forestry enterprises, have already proved profitable to industrious and thrifty farmers and add a brighter hue to farm outlook of this area.

Although the first trees were planted less than 10 years ago and the crop is still somewhat in the experimental stage, Pearl River County farmers believe that tung oil tree culture promises a reasonable return when included as part of a general farming program and correct methods are employed in the production of the crop. They have already planted more than 100,000 acres to tung trees.

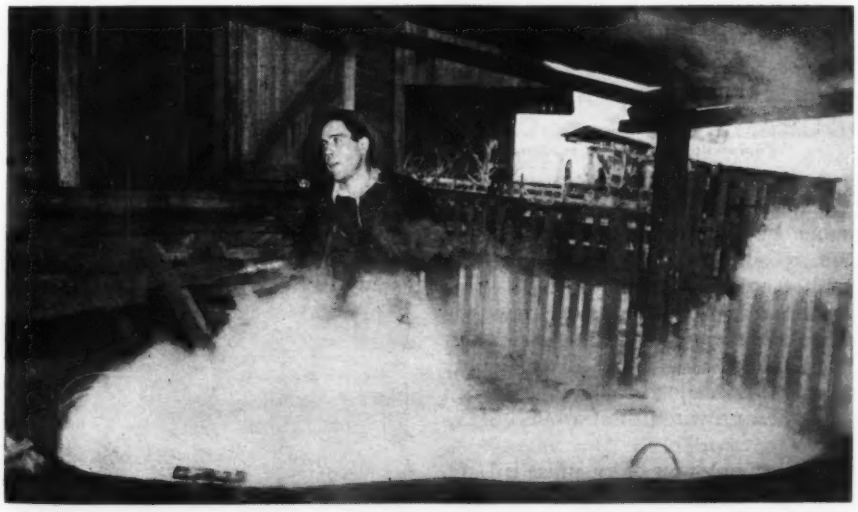
### Several Possible Combinations

Sugar cane and satsuma oranges are intensely cultivated crops, fit into a general farming program, require considerable labor, help provide year-round employment, and yield a high return per acre. Tung culture is better adapted to the use of improved machinery, and a larger acreage can be handled. Nor does this crop conflict with the production of general field crops, as much of the work can be done during the fall and winter season.

The possibilities open to farmers who can skillfully combine these enterprises into a highly diversified, well-organized, and carefully balanced program are revealed in the accomplishments of successful Pearl River County farmers. County Agent J. M Sinclair of Poplarville cites the record of Carl Bass, who last year produced more than 16,000 gallons of choice sugar-cane syrup on 30 acres of land. Mr. Bass has a modern syrup-making plant, uses the invertase method in processing his syrup to prevent sugaring, and has developed such a demand for his product that he is able to sell his entire output at premium prices.

Besides making 16,000 gallons of syrup, Mr. Bass harvested enough cane to plant an additional 15 acres in an attempt to supply the growing demand for his syrup. Selection of fertile, well-drained, light sandy loam soil rich in humus, planting of C O 290, a highly productive variety, liberal use of a complete fertilizer, clean cultivation, proper harvesting, and processing are practices which Mr. Bass has followed in obtaining big yields of high quality syrup.

From 2.4 acres of sugar cane, J. W. Bazor, Poplarville, produced and sold 1,156 gallons of syrup and 4,800 stalks

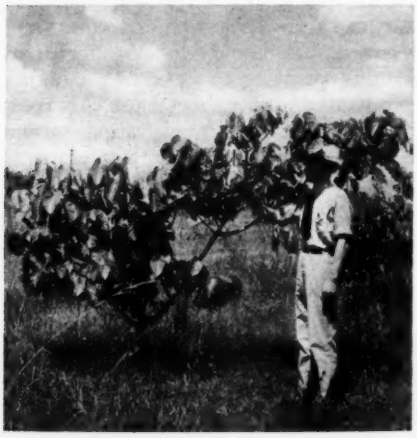


**The juice from the cane, having been extracted by crushing the stalks in a power-mill, is being condensed by cooking in open evaporators into a superior syrup noted for its light golden color and delicious flavor.**

of cane for seed for a gross return of $498. Production costs, including planting, cultivating, fertilizing, harvesting, containers, and processing, totalled $289.

J. E. Landrum, Hickory Grove, harvested 174.2 tons of cane from 8½ acres, which he sold to the syrup plant at Poplarville for $540. His total production and marketing cost was $340, his net return, $217.

To the 66,787 Mississippi farmers who grow sugar cane, Dr. J. C. Robert, superintendent of the Poplarville Experiment Station, recommends the use of 800 pounds of 4-8-4 fertilizer per acre, 500 pounds to be applied at planting time or during early growth, and 300 pounds applied as a side-dressing



**An uncultivated, 3-year-old tung oil tree at the Poplarville Experiment Station.**

when the cane is 3 to 4 feet high. The same kind and amount of fertilizer are recommended for both first-year and second-year stubble cane.

Although there were less than 600 acres in bearing satsuma orchards last year, producers in Pearl River County shipped 223 carloads of oranges which brought a gross return of around $125,000.

Biggest producer of satsumas is L. O. Crosby, who has established a modern packing plant at Picayune, where the oranges are cleaned and polished by machinery, graded and packed by hand, and shipped in carload lots. Mr. Crosby has obtained enormous yields of oranges. He has set his orchards on the most fertile soil, grows vetch as a winter cover and green manure crop, applies 800 to 1,000 pounds of 6-8-6 fertilizer per acre, and practices clean cultivation in the spring and summer.

Around 100,000 acres in the county have been set to tung trees on about 100 special tung oil farms and 250 general farms which have included tung orchards as part of the farming program. Producers have found that they can care for a fair-sized tung orchard and harvest the nuts without interfering seriously with their regular farming operations.

As a result of the operations of promoters who planted tung trees on land unsuited for this crop and who neglected cultivation, fertilization, and other essential methods, farmers have been impressed with the necessity of using correct practices in establishing and handling tung orchards. Producers now know from experience and from experiments at the Poplarville Experiment Station that they must select suitable soil, terrace the land to control erosion and conserve moisture, plant select seedlings from productive trees, grow summer and winter legumes to

**Note the better growth and foliage on this 3-year-old tung tree that was cultivated.**

**This row of fine-looking orange trees grew on the farm of L. O. Crosby, Picayune, Miss. He is Pearl River County's largest producer and shipper of Satsuma oranges.**

add nitrogen and maintain the humus content of the soil, and apply superphosphate or basic slag under legumes, use a complete fertilizer under tung trees, and cultivate the trees clean for the first 3 or 4 years.

County Agent Sinclair, who has cooperated with producers in conducting demonstrations on their farms, tells how construction of terraces and production of legumes have saved tung orchards from dying and greatly increased the production of tung nuts.

### Some Satisfactory Results

Beginning in the fall of 1937, a demonstration was conducted on a 5,000-acre 5-year-old tung orchard managed by C. Q. Hartzog. The farm had never been terraced, sheet erosion was taking a heavy toll of soil fertility, and gullies were destroying the steeper cultivated slopes. The trees were making little growth, dead branches began to appear, and a considerable number of the trees died that year. The orchard did not produce enough nuts for harvest.

Four terracing crews were organized and trained, 3,000 acres of the orchard were terraced during the winter of 1937, fertilized with a complete fertilizer in the spring, and cultivated three times during the spring and summer.

In the spring of 1938, 2,000 acres of this orchard were seeded to crotalaria and fertilized with 500 pounds of basic slag per acre. The fertilized crotalaria produced an average of about 20 tons of green matter per acre, tung trees made an average growth of about 4 feet and yielded more than a ton of nuts per acre. On 5 check plots which did not receive basic slag, the crotalaria produced only about 5 tons of green matter per acre, and the tung trees made noticeably less growth and a smaller production of nuts.

Sinclair reported that on another 5,000-acre tung orchard on similar soil, which was not terraced and on which no legumes had been grown, trees 2 years older and with about the same amount of fertilizer yielded a small crop of nuts in 1936, very few in 1937, and only 400 pounds per acre in 1938.

Proper grazing with livestock has also proven to be a profitable practice in connection with tung orchards. Mr. Hartzog, Sinclair reports, planted 250 acres of tung trees to hairy vetch and 250 acres to Austrian winter peas in

(*Turn to page* 45)

# Growing Tomatoes For More Profit

*By C. H. Nissley*

Horticulturist, Agricultural Extension Service, New Brunswick, New Jersey

LAST YEAR (1939) was a record year for New Jersey canhouse tomato growers. One hundred eighty-three growers harvested more than 10 tons of tomatoes per acre on 5 or more acres per farm. The largest yield recorded during the year was 18.05 tons per acre grown on 8.6 acres by Joseph D. Snyder of Burlington, N. J.

Records were made possible through the New Jersey Ten-ton Canhouse Tomato Club which has been functioning since 1934 and includes all tomato growers in New Jersey growing 5 or more acres of tomatoes and producing 10 or more tons to the acre. To qualify as a member, the grower must file with the Extension Service of the State University a record of his production methods before November 1. One hundred twenty-one growers, or 66% of the 183 eligible, filed records with the Extension Service this past season. Great credit is due these growers for taking the interest and time necessary to prepare and file their production records, which represent a total of more than 1,435 acres, or an average of 11.86 acres per farm.

The high lights of these records show that in addition to following general, sound, practical recommendations, a grower must necessarily have to use his own good judgment in interpreting these recommendations for his own particular soil and farm-management set-up. A brief summary of some of the important practices of these 121 growers is as follows:

*Varieties Grown*

711 acres of Marglobe
659 acres of Rutgers
64 acres of Pritchard

*Source of Plants*

975 acres, southern grown plants
458 acres, local grown plants

*Date of Planting*

96 growers planted before May 15
21 growers planted before May 16-31
4 growers planted after June 1

*Method of Field Planting*

95 growers used machines
26 growers planted by hand

*Ridge or Level Culture*

98 growers planted on a ridge
23 growers planted on the level

*Manure and Cover Crops*

84 growers applied manure
57 growers plowed under cover crop
11 growers planted on old sod fields plowed under
35 growers planted on ground allowed to remain bare during the winter

*Kind of Fertilizer Used*

40 growers used a 5-8-7
29 growers used a 4-8-10
52 growers used 16 other combinations

*Amounts of Fertilizer per Acre*

9 growers used 500 lb. or less with manure plowed under
46 growers used 500 to 1,000 lb.
52 growers used 1,001 to 1,500 lb.
14 growers used 1,501 lb. and over

*Cultivations Given Growing Crop*

7 growers cultivated 3 times
28 growers cultivated 4 times
29 growers cultivated 5 times
26 growers cultivated 6 times
15 growers cultivated 7 times
10 growers cultivated 8 or more

*Planting Distances*

24 growers planted 4 x 4 feet
18 growers planted 3 x 5 feet
79 growers planted other distances

Joseph D. Snyder of Burlington, N. J., held first place in the yield class by producing 18.05 tons of tomatoes per acre on 8.6 acres. Most of his plants,

southern grown Rutgers, were planted with a one-row transplanter using plenty of water at time of planting. The soil where these tomatoes were planted was well drained and had been planted to rye the previous fall. In the early spring 1,000 pounds of a dolomitic hydrated lime were broadcast over the rye and plowed under.

The method of fertilizing this record yield was rather out of the ordinary for New Jersey; 800 pounds of a 5-8-7 commercial fertilizer were side-dressed and cultivated into the soil one week after the plants were set into the field. The second application of 800 pounds of the same analysis fertilizer was made when the drill could barely get through the plant rows. At each cultivation, soil was pulled towards the row so as to smother out small weeds. Mr. Snyder's soil was in good condition, and the plowing under of hydrated dolomitic lime while plowing under rye was a good practice under his conditions.

Elmer L. Baus of Hightstown grew the second highest yield of 16.5 tons of tomatoes per acre on 6.6 acres. In the growing of these tomatoes, 6 tons per acre of barnyard manure were spread over wheat stubbles and all plowed under in the early spring. One thousand pounds of a 4-8-10 complete fertilizer mixture was then broadcast and thoroughly disked into the soil about a week before planting. Southern grown Rutgers and Marglobe tomato plants were planted between the 12th and 15th of May. The ground was pulled towards the plants at each cultivation and finally ridged with a Riggs plow. Mr. Baus' returns were approximately $290 per acre for the tomatoes delivered to the factory.

Sherman T. Perkins of Wrightstown grew the third highest yield of 16.2 tons per acre on 8.9 acres. Although Mr. Perkins held third place this year, he can well be called *the* canhouse tomato grower of New Jersey. Mr. Perkins has grown tomatoes continuously since 1918, missing the Ten-ton Tomato Club only by one year. His average yield for the past 6 years was 13.5 tons per acre.

Mr. Perkins follows a definite crop

**Yield winners in the New Jersey Canhouse Tomato Contest, back row (left to right): Joseph D. Snyder, 1st Prize; Elmer L. Baus, 2nd Prize; and Sherman T. Perkins, 3rd Prize. Quality winners, front row (left to right): Ludwig Dallenback, 1st Prize; Grover C. Hurff, 2nd Prize; and Elmer A. Tindall, 3rd Prize.**

rotation with tomatoes, followed by wheat, 2 years in grass for hay, corn, and potatoes. The field in which the tomatoes were grown this past season was in potatoes last year and was fertilized with a ton of a 4-8-10 commercial fertilizer mixture per acre. After the potatoes were harvested, rye was planted as a winter cover crop. During the winter, 12 tons per acre of stable manure were broadcast over the rye. After plowing in the early spring, 1,000 pounds of a hydrated lime were broadcast over the tomato ground and thoroughly disked into the plowed soil.

Mr. Perkins has always believed in deep plowing and in the preparation of a deep plant bed, plowing 8 to 10 inches deep is not unusual. After the lime had been applied, 1,400 pounds of a 4-8-10 commercial fertilizing mixture were placed in the tomato row, using the potato planter. This fertilizer was applied at least 10 days to 2 weeks before the plants were field planted. Southern grown Marglobe plants were used by Mr. Perkins, planting with a transplanting machine. Five cultivations were made, pulling the soil towards the plants at each cultivation.

### Winners of the Quality Class

Ludwig Dallenbach of Cranbury won the first prize in the quality class by producing more than 10 tons of tomatoes per acre on 7 acres and delivering to the canhouse an average grade of 83% of U. S. No. 1, 17% of No. 2, and no culls.

Mr. Dallenbach grew both the Rutgers and the Marglobe variety on his acreage. The crop this year was planted in a field which had grown white potatoes for the past 4 years and had been heavily fertilized with a ton of 4-8-10 commercial fertilizer to the acre each year. To grow the high quality canhouse tomatoes, 1,000 pounds of hydrated lime and 300 pounds of cyanamid were broadcast and plowed under in the early spring. No additional applications of fertilizer were made to this soil for the growing of this high quality crop. Five cultivations were made during the season, pulling the ground towards the plant at each cultivation.

Grover C. Hurff of Sewell, N. J., received the second award in the quality class by producing more than 10 tons of tomatoes on 14 acres of ground and receiving an average grade of 81% U. S. No. 1, 18% No. 2, and 1% culls. Mr. Hurff is located on a sandier type of soil than are the other growers, and therefore his method of fertilizer application differed. The tomato ground was prepared in the very early spring, plowing under a cover crop of rye. Immediately after the plowing, 1,000-1,500 pounds of a hydrated lime were broadcast over the entire field and disked into the soil. After the field was marked for planting 1,000 pounds per acre of a 5-8-7 fertilizer were broadcast on the sandier areas in the field.

In making up the rows, the top-soil was thoroughly mixed with the fertilizer by bringing it together in the row. On the sandier areas in the field receiving 1,000 pounds of fertilizer before planting, an additional 1,000 pounds of a 5-8-7 commercial fertilizer were applied as a side-dressing at the last cultivation. The portion of the field receiving the side-dressing at the last cultivation produced a noticeably larger yield than that portion of the field which did not receive the extra side-dressing.

Elmer A. Tindall of Windsor received a third prize in the quality class by producing more than 12 tons of tomatoes on 10 acres and receiving a grade of 80% No. 1, 19% No. 2, and 1% culls. The soil in which this crop was grown was planted in both tomatoes and field corn the previous season, followed by rye planted as a winter cover crop. In the early spring the rye was plowed under, plowing to a depth of 8 to 10 inches. One thousand pounds of hydrated lime per acre were broadcast and disked into the plowed ground, after which 1,000 pounds of a 5-8-7 commercial fertilizer were broadcast with a grain drill. This fertilizer was thor-

(*Turn to page* 33)

# PICTORIAL

READY AND EAGER FOR SOME SPRING SUNSHINE

**Above: Oxen are still furnishing the "horse" power in some localities.**
**Below: Efficient machinery makes smoother seedbeds with less work.**

Above: Spring—and the pots are boiling in the "maple syrup country."
Below: The hardware store is a center of interest at this time of year.

Above: There's at least one explorer in every brood.
Below: A much-desired "aggie" is in the offing.

# The Editors Talk

## Fewer But Better Fertilizer Grades

Reducing the large number of fertilizer grades or analyses to a reasonable number of efficient high analyses has been a major objective of many agricultural groups for some years. At times progress seems slow, then a State here and there effectively reduces the list of unnecessary grades and the resulting encouragement stimulates other States to try to do something about the hundreds of needless and often expensive low-grade fertilizers on the market in their respective territories. In recent years much definite progress along this line has been made in all fertilizer-using areas of the United States and Canada.

Typical of attainment along this line is the meeting held recently between the fertilizer trade and the advisory agricultural officials of New York State. This meeting, at which the most suitable fertilizer grades for use in the State of New York were frankly and ably discussed, resulted in the revision for 1940 of the leaflet No. 9, "Approved Fertilizers for New York," a contribution from the Departments of Agronomy, Vegetable Crops, Pomology, and Floriculture and Ornamental Horticulture.

Basic to all permanent progress in the reduction of fertilizer grades is the adoption of some sort of system on which to select the fertilizer analyses to be retained on the approved lists. Different systems of such selection are in use, and as with all selective methods, there are good and bad points about each.

New York State has adopted the ratio system. This means that for the three major fertilizer elements, nitrogen, phosphate, and potash, the ratio of each shall be related to one as a whole number, as one for nitrogen, one for phosphoric acid, and one for potash or the 1-1-1 ratio, or 1 nitrogen, 2 phosphoric acid, and 2 potash—the 1-2-2 ratio. The advantages of this system are several, chiefly, a much smaller number of ratios is necessary than if fertilizer analyses alone were selected, as for instance the 1-1-1 ratio can be represented by many different analyses. Another point is that the selection of ratios insures a significant difference between the percentage of each element. Thus the 1-2-2 and the 1-2-3 ratios stated in terms of single strength goods, could be supplied by the 4-8-8 and the 4-8-12, respectively.

Agronomy leaflet No. 9 contains a list of 11 approved ratios, selected after a conference with representatives of the fertilizer industry. Based on these ratios are the approved analyses—though other analyses in the same ratios are, of course, possible. The plant-food content of common fertilizer materials is also given.

A point of great importance discussed in the leaflet is the advantage of high analysis over low analysis fertilizer. An excellent graph shows how much more value is obtained by the farmer when he buys the high analysis 5-10-5 over the lower analysis 4-8-4, both the same ratio. The fertilizer recommendations are

given in all necessary detail as for grains, hay, silage, pastures, truck crops, for rotations for muck soils, and for fruit and ornamentals.

The fertilizer industry is to be congratulated for taking an interest in such meetings and for trying to follow the recommendations when they have been approved. Agricultural officials in advisory, regulatory, and other groups are showing the way in this much needed effort to reduce the number of unnecessary fertilizer grades and to change low fertilizer grades into high grades. All groups in the industry should continue to follow up this good work by cooperating with their State Colleges and Stations and putting the results of such conferences into effect.

# Keeping Records

In struggling with income tax returns, the importance of keeping records was re-emphasized upon most of us. Not only are such accounts time-savers in making reports, but if studied they are a big help to any individual who seriously plans for the future.

In probably no other group has record-keeping been more neglected than among farmers. Likewise, probably nowhere at the present time is it more important. With current production and marketing methods necessitating careful planning in order to maintain a desirable margin of profit, a successful farmer must keep accurate account books.

The excellent work being done by extension forces toward educating farmers to the importance of this matter is widely noted. Year-end check-ups and inventories are advised as a foundation for the plans of the new growing season. How 1940 turns out for a lot of growers will depend to no small extent upon a thorough knowledge of what they did or did not accomplish in 1939. It is to be hoped that whatever this year may hold in store, it will be accurately recorded by a greater number of them.

# Fertilizer Films Made Available

The American Potash Institute, Inc., is announcing that its colored motion picture films are now being made available for free loan to agricultural colleges and experiment stations, county agricultural agents, vocational teachers, and responsible farm organizations and members of the fertilizer trade. Short, detailed descriptions of these films and instructions as to how interested parties can obtain the loan of them are to be found on the back cover of this magazine.

The films are thoroughly authoritative in character, being taken in most part in cooperation with official agricultural sources and depicting official experimental work. Based on comment at preliminary showings, these films should be of great service in disseminating the more recent observations and conclusions on the profitable use of fertilizers, particularly potash. While apparently sectionalized, most of the pictures are so broad in subject and application that they will be of interest and value in other regions.

# REVIEWS

**This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture, the State Experiment Stations, and Canada, relating to Fertilizers, Soils, Crops, and Economics. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.**

## Fertilizers

¶ The use of boron in controlling certain crop diseases has received more than passing interest in comparatively recent years. Among the outstanding investigations in which this so-called "secondary element" played an important function in the successful production of certain crops under certain soil conditions, are the works of W. L. Powers and A. G. B. Bouquet, both of the Oregon Agricultural Experiment Station. Recent findings of these scientists are given in Station Circular of Information numbers 212 and 213 (revisions of previous publications) "Celery Stem Crack and the Use of Boron in Its Control" and "Use of Boron in Controlling Canker of Table Beets," respectively. The effects of boron deficiency on these crop, amounts of boron recommended, methods of application to correct the deficiency, and results obtained are described. The information contained in these circulars is particularly valuable to Oregon vegetable growers, because of the great preventable loss in gross income, if borax be applied to those areas where it is required.

*"Pointers in Fertilizing Citrus," Agr. Ext. Serv., Honolulu, Hawaii, Ext. Cir. 46, Feb. 1940, Ashley C. Browne.*

*"Pointers in Fertilizing Macadamia," Agr. Ext. Serv., Honolulu, Hawaii, Ext. Cir. 51, Feb. 1940, Ashley C. Browne.*

*"Pointers in Fertilizing Avocados," Agr. Ext. Serv., Honolulu, Hawaii, Ext. Cir. 52, Feb. 1940, Ashley C. Browne.*

*"Pointers in Mango Fertilization," Agr. Ext. Serv., Honolulu, Hawaii, Ext. Cir. 53, Feb. 1940, Ashley C. Browne.*

*"Fertilizing Irish Potatoes," Agr. Ext. Serv., Honolulu, Hawaii, Ext. Cir. 54, Feb. 1940, Ashley C. Browne.*

*"Progress Report of Phosphate and Other Fertilizer Investigations at the Aberdeen Branch Experiment Station, University of Idaho," Agr. Exp. Sta., Moscow, Idaho, Bul. 230, Oct. 1939, John L. Toevs and G. Orien Baker.*

*"A Preliminary Report of Certain Variety, Fertilizer, and Other Tests, Conducted by the Crops and Soils Department of the Louisiana Experiment Station, 1939," Agr. Exp. Sta., University, La., Mimeo., 1939.*

*"Experiments with Cabbage, 1939," Agr. Exp. Sta., State College, Miss., Inform. Sh. 176, Sept. 1939, J. A. Campbell and L. R. Farish.*

*"Experiments with Peas, 1939," Agr. Exp. Sta., State College, Miss., Inform. Sh. 177, Sept. 1939, J. A. Campbell and L. R. Farish.*

*"Experiments with Tomatoes—1939," Agr. Exp. Sta., State College, Miss., Inform. Sh. 181, Nov. 1939, J. A. Campbell and L. R. Farish.*

*"Peanut Production," Agr. Exp. Sta., State College, Miss., Inform. Sh. 185, Dec. 1939, John Pitner.*

*"Fertilization for Cotton and Corn in the Hill Section of Mississippi," Agr. Exp. Sta., State College, Miss., Inform. Sh. 186, Dec. 1939, J. L. Anthony.*

*"Rates and Dates of Applying Nitrogen for Cotton," Agr. Exp. Sta., State College, Miss., Service Sh. 274, Dec. 1939, Roy Kuykendall.*

*"Soil Fertility Experiments—Heathman Field," Agr. Exp. Sta., State College, Miss., Serv. Sh. 276, Dec. 1939, Roy Kuykendall.*

*"Soil Fertility Experiments with Cotton—Smith Field, Lazoo River Basin Soil North of Central East Delta," Agr. Exp. Sta., State College, Miss., Serv. Sh. 277, Dec. 1939, Roy Kuykendall.*

*"Soil Fertility Experiments with Cotton—Ladd Field North of the Central East Delta," Agr. Exp. Sta., State College, Miss., Serv. Sh. 278, Dec. 1939, Roy Kuykendall.*

*"Soil Fertility Experiments with Cotton—Atkinson Field in the South East Yazoo-Mississippi Delta," Agr. Exp. Sta., State College, Miss., Serv. Sh. 279, Dec. 1939, Roy Kuykendall.*

*"Soil Fertility Experiments with Cotton—Schaeffer Field, Yazoo River Basin Soil in the South East Delta," Agr. Exp. Sta., State College, Miss., Serv. Sh. 280, Dec. 1939, Roy Kuykendall.*

*"Soil Fertility Experiments with Cotton—Hemphill and Gary Fields in the Central East Delta Area," Agr. Exp. Sta., State College, Miss., Serv. Sh. 281, Dec. 1939, Roy Kuykendall.*

*"Use of T. V. A. Phosphates on Pastures, A Progress Report, 1938-1939, Based Upon Field Experiments," Agr. Exp. Sta., State College Station, Raleigh, N. C., Agron. Inf. Cir. 120, Jan. 1940, W. W. Woodhouse, Jr.*

*"Some Practical Findings from Fertilizer Experiments in North Carolina with Different Crops," Agr. Exp. Sta., State College Sta., Raleigh, N. C., Agron. Inform. Cir. 121, Jan. 1940, C. B. Williams.*

*"Fertilizing South Carolina Crops, Including Suggested Home Mixtures, Suggested Analyses, Lime Recommendation," Agr. Ext. Serv., Clemson, S. C., Ext. Cir., Jan. 1940, E. H. Rawl, H. A. Woodle, and H. A. McGee.*

*"What Fertilizers for Small Grains and Seedings of Clover and Alfalfa," Agr. Exp. Sta., Univ. of Wis., Madison, Wis., Mimeo., Sept. 1939, C. J. Chapman.*

## Soils

¶ The use of standardized or calibrated chemical methods in determining nutrient deficiencies of soils should first be interpreted on the basis of crop yields from field results, J. F. Reed and M. B. Sturgis conclude in Louisiana Experiment Station Bulletin 313, "The Use of Chemical Methods for the Determination of Available Nutrients in Louisiana Soils." The authors emphasize that with proper soil sampling and testing, and a knowledge of the soil types and plant-food requirements of different crops, chemical tests should be of definite value in interpreting nutrient deficiencies or sufficiencies in soils to prevent crop failure or waste due to improper choice of fertilizers.

Supporting these statements are many valuable data on determinations made of the available nutrient contents of typical soils from the various soil divisions of the State. From a comparison of the three methods used, the LaMotte Kit, the Universal Soil Testing System, and the dilute hydrochloric acid method, an agreement is apparent between the results given by the LaMotte Kit and the dilute hydrochloric acid method. It is pointed out, however, that the Universal method is designed chiefly for the coarse-textured soils of Connecticut, and apparently the extracting solution is too weak for the soils of Louisiana. Data given in the several tables, in addition to showing the values from these tests, refer to the known field response of cotton to fertilizer.

Both the A and B horizons were sampled and tested. The general differences in nutrient levels between the various divisions are obvious, and variations within a series and a type are also evident. The determinations consisted of available phosphorus, potassium, calcium, magnesium, and nitrates. Included also were pH, total nitrogen, exchange capacity, and degree of base saturation.

In evaluating the chemical soil tests, the authors advise that "the point has not been reached, however, where routine sampling, testing, and interpretation can be made by persons unfamiliar with the techniques of the methods and the nature of the soils and crops."

*"Soil Management Experiments," Agr. Exp. Sta., Lexington, Ky., Bul. 397, Nov. 1939, Geo. Roberts, J. F. Freeman, and E. J. Kinney.*

*"Chemical Composition of the Soils of Cass, Dickens, Falls, Hardeman, Polk, Scurry, and Wheeler Counties," Agr. Exp. Sta., College Station, Brazos County, Tex., Bul. 581, Jan. 1940, G. S. Fraps and J. F. Fudge.*

*"Method and Procedure of Soil Analysis Used in the Division of Soil Chemistry and Physics," U. S. D. A., Washington, D. C., Cir. 139, Nov. 1939, W. O. Robinson.*

## Crops

¶ "Yield and Composition of Everglades Grass Crops in Relation to Fertilizer Treatment," Bulletin 338 of the Florida Agricultural Experiment Station, by J. R. Neller and A. Daane, is an interesting report on the fertilizer requirements, yields, and nutritive composition of grasses fed to cattle in the form of hay and by pasture feeding. Based on field studies made on the organic soils at the Everglades Station, a Dallis grass pasture should receive phosphate and potash equivalent to the amounts contained in 500 pounds of 0-6-12 per acre. These plant foods should be applied at least once a year to keep the pasture at a moderately high

point of potential productivity, as shown by yield records of 33 cuttings from the fertility plots over a 7-year (1931-37) period. There was also a marked response to phosphate and potash in the annual yield of carpet grass, equivalent to the amounts shown for Dallis grass.

With Dallis grass, the 0-6-12 formula at 500 pounds per acre produced an average annual yield of 11,345 pounds of hay per acre, dry basis. This yield was more than double that of the check treatment, and about 40 to 60 per cent higher than hay yields obtained from phosphate or potash used singly. The phosphate-potash fertilizer application on the carpet grass plots gave an average annual yield of 8,824 pounds air-dry hay, which likewise was more than double the check treatment, and correspondingly higher yields than those of the phosphate or potash only treatments.

Analyses of the plucked grasses indicated that ample amounts of calcium, magnesium, and iron are present in the Everglades sawgrass peat soils. Other secondary nutrients, such as copper, zinc, and manganese, were used without apparent benefit. Climate, soils, and necessary water control are discussed in relation to growing grass crops in the Everglades.

*"Soybeans," Dept. of Agr., Exp. Farms Serv., Ottawa, Ontario, Canada, Pub. 660, Farmers' Bul. 80, Dec. 1939, F. Dimmock.*

*"The Production of Mangel and Sugar Beet Seed," Dept. of Agr., Exp. Farms Serv., Ottawa, Ontario, Canada, Pub. 679, Cir. 154, Dec. 1939, R. M. MacVicar and F. S. Nowosad.*

*"The Production of Swede Turnip Seed," Dept. of Agr., Exp. Farms Serv., Ottawa, Ontario, Canada, Pub. 680, Cir. 155. Dec. 1939, F. S. Nowosad and R. M. MacVicar.*

*"Directory of Organization and Activities of the Dominion Department of Agriculture," Dept. of Agr., Ottawa, Ontario, Canada, July 1939.*

*"The Shelton and Hebron Strawberries," Agr. Exp. Sta., New Haven, Conn., Cir. 137, Nov. 1939, D. F. Jones and W. R. Singleton.*

*"Early Sweet Corn Hybrids, Spancross, Marcross, and Carmelcross," Agr. Exp. Sta., New Haven, Conn., Cir. 138, Dec. 1939, W. R. Singleton and D. F. Jones.*

*"Lupine, Seed-producing Winter Legume," Agr. Exp. Sta., Gainesville, Fla., Press Bul. 541, Nov. 1939, J. D. Warner.*

*"Fifty-first Annual Report of the University System of Georgia, for the Year 1938-39," Agr. Exp. Sta., Experiment, Ga., H. P. Stuckey, Dir.*

*"A Year's Progress in Solving Farm Problems of Illinois, 1936-37," Agr. Exp. Sta., Urbana, Ill., 1939.*

*"Three New Varieties of Bush Lima Beans," Agr. Exp. Sta., Urbana, Ill., Bul. 461, Dec. 1939, W. A. Huelsen.*

*"Eleven Years of Soybean Investigations, Varieties, Seeding, Storage," Agr. Exp. Sta., Urbana, Ill., Bul. 462, Jan. 1940, W. L. Burlison, C. A. Van Doren, and J. C. Hackleman.*

*"Illinois Corn Performance Tests, 1939," Agr. Exp. Sta., Urbana, Ill., Bul. 463, Jan. 1940, R. R. Copper, G. H. Dungan, A. L. Lang, J. H. Bigger, Benjamin Koehler, and Oren Bolin.*

*"A Physiological Study of the Winter Wheat Plant at Different Stages of Its Development," Agr. Exp. Sta., Manhattan, Kan., Tech. Bul. 47, July 1939, Edwin C. Miller.*

*"Agricultural Extension Work in Louisiana, 1937," Agr. Ext. Serv., University, La., J. W. Bateman, Dir.*

*"The Massachusetts Commercial Vegetable Grower," Agr. Ext. Serv., Amherst, Mass., No. 23, Feb. 1940.*

*"Fruit Notes," Agr. Ext. Serv., Amherst, Mass., Mimeo., Jan. 1940, W. H. Thies.*

*"The Quarterly Bulletin," Agr. Exp. Sta., East Lansing, Mich., Vol. 22, No. 3, Feb. 1940.*

*"Michigan State Board of Agriculture, 1939, Seventy-eighth Annual Report of the Secretary of the State Board of Agriculture of the State of Michigan and Fifty-second Annual Report of the Experiment Station from July 1, 1938 to June 30, 1939," St. Dept. of Agr., Lansing, Mich., 1939.*

*"Highlights of the Work of the Mississippi Experiment Station, Fifty-second Annual Report for the Fiscal Year Ending June 30, 1939," Agr. Exp. Sta., State College, Miss., Clarence Dorman.*

*"Agricultural Research for Mississippi Farmers," Agr. Exp. Sta., State College, Miss., Sp. Bul., Dec. 1939, Clarence Dorman.*

*"The Year-round Home Garden," Agr. Ext. Serv., State College, Miss., Ext. Bul. 107, Nov. 1939, R. O. Monosmith.*

*"Mississippi Farm Research," Agr. Exp. Sta., State College, Miss., Vol. 3, No. 2, Feb. 1940.*

*"Forage Production, Its Use and Approximate Costs in Northeastern Nevada," Agr. Exp. Sta., Reno, Nev., Bul. 150, Nov. 1939, C. E. Fleming and C. A. Brennen.*

*"List of Publications," Agr. Exp. Sta., Cornell, Ithaca, N. Y., Bul. 47, Jan. 1940.*

*"Bimonthly Bulletin," Agr. Exp. Sta., Fargo, N. Dak., Vol. 11, No. 3, Jan. 1940.*

*"The Bimonthly Bulletin," Agr. Exp. Sta., Wooster, Ohio, Vol. XXV, No. 202, Jan.-Feb. 1940.*

*"The Effect of Shade on Pasture," Agr. Exp. Sta., Knoxville, Tenn., Cir. 65, Dec. 1939, L. R. Neel.*

*"Common Diseases of Tomatoes," Agr. Exp. Sta., College Station, Brazos County, Tex., Cir.*

*86, Jan. 1940, P. A. Young, A. L. Harrison, and G. E. Altstatt.*

*"Department of Agriculture-Immigration of Virginia," St. Dept. of Agr., Richmond, Va., Bul. 378, Feb. 1940.*

*"Tobacco Varieties & Strains in Wisconsin," Agr. Exp. Sta., Madison, Wis., Bul. 448, Dec. 1939, James Johnson and W. B. Ogden.*

*"Report of the Chief of the Bureau of Agricultural Chemistry and Engineering, 1939," U. S. D. A., Washington, D. C., 188632, 1940, Henry G. Knight, Chief.*

*"Report of the Chief of the Forest Service, 1939," U. S. D. A., Washington, D. C., F. A. Silcox, Chief.*

*"Sugar-beet Culture in the Humid Area of the United States," U. S. D. A., Washington, D. C., Farmers' Bul. 1637, April 1939, J. G. Lill.*

*"Results of Tomato Variety Tests in the Great Plains Region," U. S. D. A., Washington, D. C., Cir. 533, Nov. 1939, M. F. Babb and James E. Kraus.*

*"Early Cheyenne Pie Pumpkin," U. S. D. A., Washington, D. C., Cir. 537, Nov. 1939, LeRoy Powers.*

*"List of Bulletins of the Agricultural Experiment Stations for the Calendar Years 1937 and 1938," U. S. D. A., Washington, D. C., Misc. Pub. 362, Jan. 1940, Catherine E. Pennington.*

## Economics

¶ Research Bulletin 266, "Corporate Land, Foreclosures, Mortgage Debt and Land Values in Iowa, 1939," by William G. Murray of the Iowa State College Experiment Station, calls attention to some very interesting facts relative to the farm debt situation and corporate land ownership in the State of Iowa. During the period 1930 to 1934, the mounting rate at which farm land titles were being transferred to corporations and individuals formerly interested in getting agricultural credit was looked upon with considerable alarm. It is encouraging to note that in Iowa this movement seems to be slowing down. Between January 1, 1937, and January 1, 1939, the farm land owned in Iowa by corporations increased from 11.2% to 11.9% of the farm area of the State.

The major holdings of farm land by corporations are in the hands of insurance companies who hold over two-thirds of the 4,000,000 acres owned by corporations.

The major cause for the foreclosures and the transfer of titles from farm borrowers to the corporations is over-valuation of the poorer farm land. It was noted in past studies of farm foreclosures that the highest percentage was confined to the areas where erosion and drought conditions were worse, and where the land was of a comparatively lower grade.

There has been a steady decline in the number of mortgage foreclosures in the State since about 1932, when it was estimated that 6,400 foreclosures took place. In 1938 there were only 550 foreclosures as compared to 1,500 in 1929. There were fewer foreclosures in 1936 and 1937 than in 1929 or 1930.

From about 1915 to 1920, according to the author, there was a rapid increase in the farm mortgage debt in the State of Iowa, but beginning with about 1925 there has been a gradual decline, until at the present time the debt level is about the same as it was in 1915. On January 1, 1939, approximately 40% of the farm land in Iowa was mortgaged for an average of $53 an acre.

¶ According to the mimeographed report by the Department of Agronomy of Ohio State University, "Spring and Fall Fertilizer Sales in Ohio—1939," fertilizer sales in 1939 in Ohio amounted to 345,585 tons, of which 178,308 tons were sold in the Spring, and 167,277 tons were sold in the Fall. It was estimated that 7,887 tons of nitrogen, 42,697 tons of $P_2O_5$, and 19,083 tons of $K_2O$ were contained in this tonnage.

Of the total sales, 222,305 tons were standard analyses and 2-12-6 was the leading grade with 168,293 tons.

*"Fertilizer and Fertilizer Material, Fiscal Year 1938-39," St. Dept. of Agr., Montgomery, Ala., Dept. Bul. 42, Haygood Paterson, Com.*

*"Land Tenure in Arkansas, 1. The Farm Tenancy Situation," Agr. Exp. Sta., Fayetteville, Ark., Bul. 384, Jan. 1940, J. A. Baker and J. G. McNeely.*

*"Official Results of Fertilizer Analyses for the Registration Year, 1938-39," Dept. of Agr., Ottawa, Ontario, Canada, Dec. 1939.*

*"Farmers' Cooperative Associations in Florida, IV. The Florida Citrus Exchange System," Agr. Exp. Sta., Gainesville, Fla., Bul. 339, Nov. 1939, H. G. Hamilton and Marvin A. Brooker.*

*"Marketing Louisiana Sweet Potatoes," Agr. Exp. Sta., University, La., Bul. 310, Oct. 1939, Roy A. Ballinger.*

*"How Wars Affect Maine Agriculture," Agr. Ext. Serv., Orono, Maine, Bul. 273, Dec. 1939, Donald W. Reed.*

*"Official Report, Commercial Fertilizers, Commercial Feeds, and Agricultural Liming Materials," St. Inspec. Serv., Univ of Md., College Park, Md., No. 173, Jan. 1940.*

*"Inspection of Commercial Fertilizers for 1939," Agr. Exp. Sta., Durham, N. H., Bul. 317, Nov. 1939, T. O. Smith and H. A. Davis.*

*"The Marketing of Farm Woodland Products in Carroll County, New Hampshire," Agr. Exp. Sta., Durham, N. H., Bul. 318, Dec. 1939, Alan MacLeod and John Chandler.*

*"Oklahoma Farm Price Statistics, 1910-38," Agr. Exp. Sta., Stillwater, Okla., Exp. Sta. Bul. 238, Dec. 1939, Trimble R. Hedges and K. D. Blood.*

*"Inspection and Analysis of Commercial Fertilizers," Agr. Exp. Sta., Clemson, S. C., Bul. 324, Dec. 1939, B. D. Cloaninger.*

*"Safe and Sound Cotton Farming in Tennessee," Agr. Ext. Serv., Knoxville, Tenn., Pub. 229, Nov. 1939, H. C. Holmes.*

*"Compilation of Soil Conservation and Domestic Allotment Act, as Amended, Agricultural Adjustment Act of 1938, as Amended, Federal Crop Insurance Act, as Amended, Sugar Act of 1937, Appropriation Items Relating Thereto, and Miscellaneous Laws, as of the Close of the Second Session of the Seventy-sixth Congress," U. S. D. A., AAA, Washington, D. C., Nov. 5, 1939.*

*"Report of the Chief of the Agricultural Marketing Service, 1939," U. S. D. A., Washington, D. C., 1939.*

*"Alabama Handbook, 1940 Agricultural Conservation Program," U. S. D. A., AAA, Washington, D. C., SRB-401-Ala., Jan. 1940.*

*"Arkansas Handbook (A Area), 1940 Agricultural Conservation Program," U. S. D. A., AAA, Washington, D. C., SRB-401-Ark. (A Area), Jan. 1940.*

*"Arkansas Handbook (B Area), 1940 Agricultural Conservation Program," U. S. D. A., AAA, Washington, D. C., SRB-401-Ark. (B Area), Jan. 1940.*

*"Florida Handbook, 1940 Agricultural Conservation Program," U. S. D. A., AAA, Washington, D. C., SRB-401-Ga., Jan. 1940.*

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# Growing Tomatoes For More Profit

(*From page* 22)

oughly disked into the surface soil and the ridges made 4 feet wide by pulling the soil towards the row. The plants were set deeply in this ridge with the two-row tractor transplanter before May 15.

When the tomato plants first began to bloom profusely, they received an additional application of 500 pounds per acre of a 5-8-7 commercial fertilizer applied through the fertilizer attachment to the riding cultivator. The plants grew fine and produced a heavy crop of high quality fruit.

Since 1925 the important factors in the production of large yields of canhouse tomatoes in New Jersey could be summarized as follows:

1. Select fields whose soil is well drained and capable of high production. Tomatoes produce better, larger yields in a comparatively dry year than during a wet one, therefore, drainage is an important factor.

2. Use recommended varieties, such as Rutgers, Marglobe, and Pritchard, to produce the highest yields.

3. Prepare the field early in the spring and finish planting by May 25.

4. Use only well-grown, stocky, and disease-free plants.

5. Allow plenty of space in the field for the plants to develop. Either 4 x 4, or 3 x 5-foot spacings are recommended.

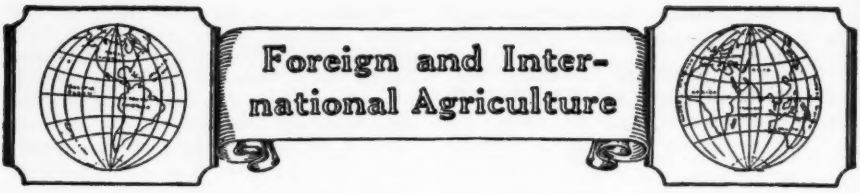
6. Provide the soil with an abundance of plant nutrients to keep the plants growing continuously. This includes manure, cover crops, lime, and the judicious and efficient use and application of a high-grade commercial fertilizer.

7. Set plants deep in the soil.

8. Cultivate as often and carefully as necessary to control weeds.

9. Control insect pests and disease in both seed beds and field.

10. Pick frequently and regularly to insure both highest yields and quality.




**To supply information on agricultural research and practice in other countries, brief abstracts of articles in foreign publications are given here. Due to space limitations, only articles of general fundamental interest are included, although the publications may contain other articles and reviews.**

### *Die Ernährung der Pflanze, Vol. 35, No. 12, December 1939*

THE IMPORTANCE OF SUPPLYING GERMAN SOILS AND PLANTS ABUNDANTLY WITH POTASH; A CONTRIBUTION TO THE QUESTION OF THE HARMONY OF NUTRIENTS. *By L. Schmitt, Darmstadt, Germany.*

Since the ability of a soil to produce high yields is influenced in part by the amounts of available nutrients, such as nitrogen, phosphoric acid, potash, and lime in them, care must be taken that they are present in sufficient amounts and in the correct proportions. Most German soils are naturally rather poor in the nutrients mentioned, and they therefore must be added in manures and fertilizers. In recent years, the average fertilizer application amounted to 15.3 pounds nitrogen, 19.8 pounds phosphoric acid, and 28.8 pounds potash per acre. The author states that even with the manure which is used in addition, the amounts of plant food applied to soils are not enough to replace those removed from the soil in average yields.

According to Liebig's Law of the Minimum, plant growth is limited by the amount of the nutrient that is lowest relative to the plant's needs. This law applies to all the nutrients, the application of one to raise its supply well above the limiting amount resulting in another nutrient then becoming the limiting factor, although on a higher level.

An experiment with spinach is taken to illustrate the effects of a lack of a nutrient. Less than 3 weeks after seeding the crop, marked differences in the growth of the young plants could be seen. The omission of nitrogen, phosphoric acid, or potash caused poor, weak plants, while a complete fertilizer produced a much more vigorous growth. The plants lacking any one of the nutrients later died.

In another instance, a commercial vegetable grower was having poor results with his lettuce. The appearance of the plants suggested to the experiment station authorities a lack of available potash, but the grower, having applied some potash in his fertilizer, was quite sure this could not be the case. Upon putting some of the soil in pots, and adding potash fertilizer to some and none to others, the greatly increased growth of the lettuce growing in the pots receiving potash was convincing proof that the farmer had not applied enough of this nutrient to meet the crop's need.

Potash deficiency symptoms do not appear in the early stages of growth of all plants. In the case of tobacco, the effects may not appear until late in the growth period, but then become so bad that the leaf is practically valueless.

With the increasing realization of the importance of a proper balance of nutrients, the term "harmony of nutrients" has been introduced into the literature on fertilizer usage. Experiments with spinach and rye grass are cited to show the practical importance of the harmony of the nutrients. These crops were grown in pots, without potash and with three different rates of potash, each of these four treatments with three levels of nitrogen fertilizer. Superphos-

phate was applied uniformly to all pots. Increasing the nitrogen application with no potash, or a low application, decreased the yield. With the medium and high potash applications, the increased nitrogen increased the yield, although best results were obtained with the medium nitrogen rate. Best yield was obtained with a nutrient ratio of 1:2:2.25. Similar results were obtained with rye grass, except that the highest nitrogen and potash application gave best results with this plant.

The composition of the plants also was influenced by the treatments. Increasing the nitrogen or potash increased the contents of these nutrients in the plants. However, increasing either one tended to decrease the content of the other, on a percentage basis. Thus, highest nitrogen content was found with plants receiving the highest nitrogen and no potash application, while highest potash content was in the plants with the highest potash and lowest or medium nitrogen application.

The vitamine C and carotin contents in the plants were determined. In the spinach plants lacking potash, and with no nitrogen fertilization, the total and oxidized forms of vitamine C were very high, and the unoxidized form very low. With the higher potash fertilization, the unoxidized form was much higher. The author states that the vitamine content is more stable when the plant received a high potash fertilization, which was considered very important from the viewpoint of marketing the vegetable. In the case of rye grass, the vitamine C content was more variable, and usually much lower in the unoxidized form, in proportion to the total amount present. The total vitamine C content had a tendency to be lower when fertilization was increased. The author states this is due largely to the shading effect of the greater growth induced by the higher fertilization, and also to the disturbance of water relationships in plants improperly nourished, whereby the formation of heavy-molecule compounds is reduced and lighter-molecule compounds favored. The vitamine C compounds fall within the later category. The formation of carotin did not seem to be influenced by fertilization, with any degree of regularity.

The article ends with a quotation from the teachings of Paul Wagner to the effect that by saturating the soil with potash and phosphoric acid, the foundation for obtaining highest yields is laid. The proper use of nitrogen then permits the regulation of plant growth to give the yield desired.

THE LEACHING OF POTASH AND PHOSPHORIC ACID IN PEAT SOILS. *By B. Tacke, Bremen, Germany.*

The amount of potash and phosphoric acid in a number of high-moor peat soils was determined to see how much these nutrients are washed out of the surface 6 inches to the subsoils 6-12 inches. Potash at 60-225 pounds per acre and phosphoric acid at 72-158 pounds were applied over periods of several years. It was found that the enrichment of potash in the subsoil amounted to 22-37 pounds per acre. It is assumed that this washed down from the surface 6 inches of soil, with some mixing of the two layers of soil at the division line due to variable depth of plowing. The phosphoric acid leached at the rate of only 1-7 pounds per year in the one field in which it was measured. There was a tendency for more potash to leach when more was applied, but this did not hold true for the phosphate. Much more leaching took place in plowed soil than if there was a sod cover.

The author states that in view of the low absorptive capacity commonly attributed to peat soils, it is surprising that more potash than that reported did not leach. The increase of potash in the surface 6 inches of soil during the period was 100-390 pounds per acre. This is taken to support the thesis that there is a comparatively good absorption of potash, but probably this is a physical rather than a chemical phenomenon. The amount of leaching

that does take place should be given consideration in fertilizing the crop, and allowance made for it, since the potash in the subsoil is not available to the crop, the roots not penetrating into the acid subsoil of high-moor peats.

MEETING OF COMMISSION IV OF THE INTERNATIONAL SOIL SCIENCE SOCIETY IN SWEDEN, JULY 1939. *By Rauterberg, Berlin, Germany.*

This is a brief report of the meeting of this section of the Society, dealing with problems of soil fertility. Of particular interest is the mention of the thoroughness with which a large sugar beet factory studies soil fertility problems of the farms growing its beets. The nutrient needs and acidity of soils are determined by rapid methods, and the yields and sugar contents are recorded on sorting cards so as to permit statistical treatment.

MEETING OF COMMISSION I OF THE INTERNATIONAL SOIL SCIENCE SOCIETY IN BANGOR, WALES, JULY 1939. *By A. Jacob, Berlin, Germany.*

A brief summary of the various papers and discussions at this meeting is given. This section of the Society concerns itself with Soil Physics.

THE INFLUENCE OF FERTILIZATION ON THE CHEMICAL AND PHYSIOLOGICAL PROPERTIES OF TOBACCO. *By J. Schweizer, Besoeki, Java.*

This is an abstract of the annual report of the tobacco experiment station at Besoeki. Tobacco growing on peat soil was troubled with leaf spots, such leaves having poor burning properties and being very thick. Analysis of the leaves showed potash to be very low on the affected leaves, this apparently being the cause of the poor burn. Working the soil reduced its chlorine content and improved the quality of the tobacco. Analyses of Virginia tobacco leaves showed that a decreasing sugar content was associated with increasing nitrogen and nicotine contents, while there was a positive correlation between potash and sugar contents. Suckering tobacco once or twice had little influence on composition, but suckering once gave the highest percentage of first quality leaves. The leaves contained more sugar in the afternoon, and this is considered the best time to harvest them. The nicotine content is lower in the yellow than in green leaves. Potash: nitrogen relationships in the leaf are discussed, bringing out the importance of a proper balance of these nutrients. Potash fertilization can prolong the growth of the lower leaves of the plant 2 to 3 weeks by preventing the accumulation of protein compounds. The relationships of carbohydrate and nitrogen in the plant also are discussed.

## *Annales Agronomiques, Vol. 9, No. 6, November-December 1939*

TEN YEARS' EXPERIMENTS ON THE ACTION OF FERTILIZERS ON THE COMPOSITION AND PROPERTIES OF A SILT LOAM SOIL. *By H. Burgevin and S. Henin, Versailles, France.*

The effects of 13 different fertilizer materials, manure, and lime on a number of chemical and physical properties of a silt loam soil were measured over a 10-year period. The soil was located on the Versailles Experiment Station Land, divided into plots of about 53 square feet, with alleys between the plots, and kept fallow during the whole period. Nitrogen was applied at the rate of 135 pounds N per acre, phosphoric acid at the rate of 900 pounds of phosphate fertilizer material, and potash at 225 pounds $K_2O$, manure at 40 tons, and lime at 900 pounds CaO. The rates of application are about double normal rates. The nitrogen fertilizers used were sulphate of ammonia, ammonium chloride, ammonium nitrate, ammophos, nitrate of soda, nitrate of lime, and dried blood. The phosphate materials were 14% superphosphate, basic slag, and rock phosphate. The potash fertilizers were muriate of potash, sulphate of potash, and high grade sylvi-

nite. These were applied each year, the nitrates in the spring, and all other in the fall, and lightly worked into the soil.

The acidity of the soil increased slightly during the period on the untreated, superphosphate, muriate of potash, and sulphate of potash plots, and even less with nitrate of soda and sylvinite. It increased markedly with all the other nitrogen carriers except nitrate of lime. The latter and rock phosphate just about kept the acidity the same as at the beginning. Manure decreased the acidity some, while basic slag and lime decreased it markedly. These trends were about the same whether the acidity was measured as hydrogen ion concentration or hydrolytic acidity.

Replaceable bases, principally Mg, and to a less extent Ca decreased some on the untreated soil, the K and Na remaining the same. Every treatment caused the exchangeable Mg to be reduced. Exchangeable Ca was reduced by all the nitrogen treatments, and to a less extent by the potash; manure and the phosphates maintained it, and the lime treatments increased it. Exchangeable potash was not influenced much by any of the treatments except manure and potash treatments, all of which increased it. Nitrate of soda and sylvinite increased the exchangeable Na, the other potash treatments having little effect. Total replaceable bases were decreased by all nitrogen treatments, except nitrate of lime, while the other treatments had little effect, except lime, which increased them.

The organic matter and organic colloids decreased in the soil without manure, and increased in the soil with manure, but only slightly considering the amount of manure added. It is estimated that about 20% of the organic matter in the manure is retained by the soil, and about the same amount of the nitrogen in the manure.

On the physical side of the investigations, the structure of the soil was greatly improved by lime and manure, slightly improved by basic slag, and not affected by sulphate of potash, the other phosphates, or the nitrogen materials, except nitrate of soda. This had a markedly unfavorable effect, as did also sylvinite, while muriate of potash had a slightly unfavorable effect. The sodium content of the potash materials is held to be the cause of this action. A pH of 6 to 7 is felt to be the critical zone for soil structure. Below pH 6, the structure did not deteriorate much, but raising the pH from 6 to 7 improved the structure greatly.

An interesting discussion of many of the points mentioned in this summary is given by the authors in the article, but limitations of space prevent this being given here.

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# Consider Plant-food Content of Crops

(*From page* 9)

matter would be comparatively simple. The problem is more complicated than this, but the following few generalities based on observation and experience, coupled with the information given in plant-food content tables, can help in developing a fertilizer program that is more efficient and profitable.

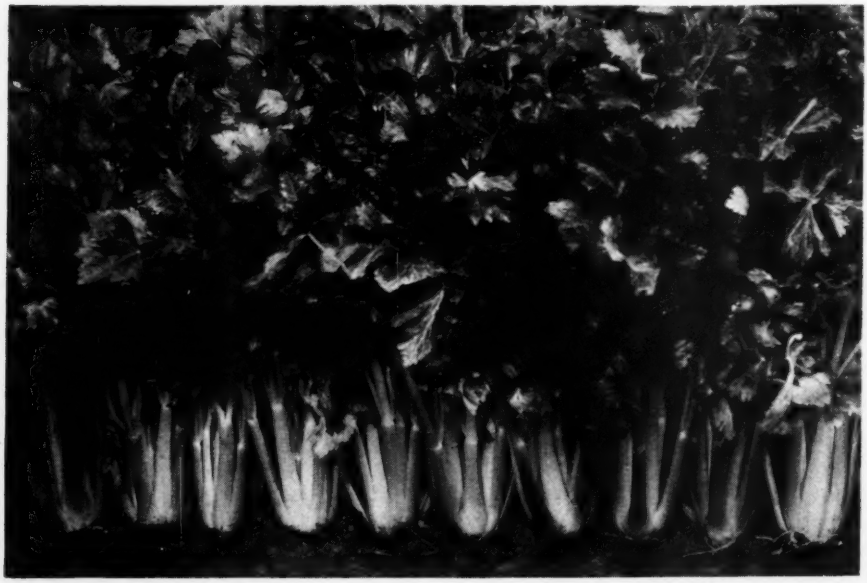
In the case of nitrogen, the organic matter in the soil is a possible source of this nutrient for all plants. In addition, legumes, by means of the nodule organisms on their roots, can obtain the greater part of their nitrogen from the air. Therefore legumes usually require little or no nitrogen in fertilizer

form except for enough to start the plant when grown on soils of low fertility or low in organic matter. The nitrogen figures for legumes thus cannot be considered as a guide to the nitrogen fertilizer needs of these crops. So far as the other crops are concerned, the nitrogen figures are important in showing the relative needs of the crops for this nutrient. The chief uncertain factors here are the amount of organic matter in the soil and the extent to which the crop can draw on the nitrogen in it.

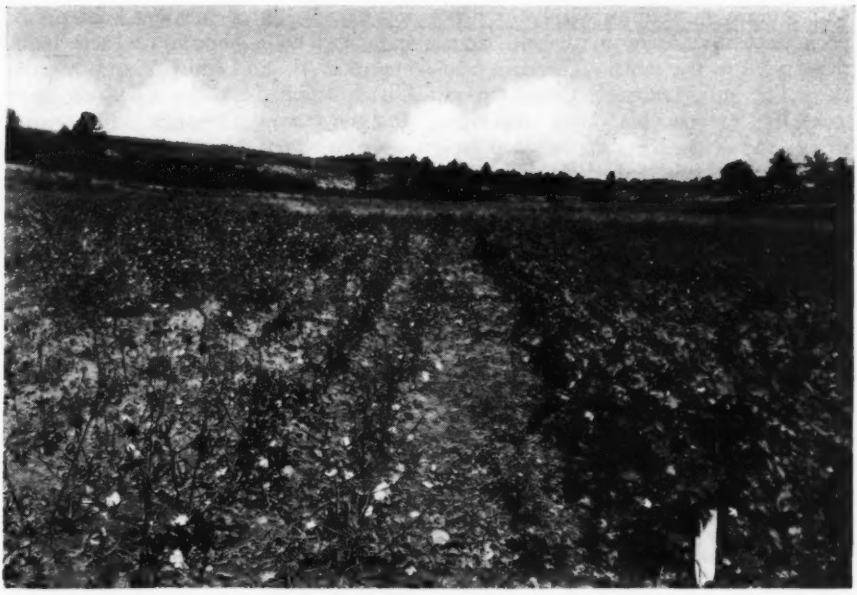
The phosphoric acid for the crop, for all practical purposes, comes entirely from the soil supply or fertilizer and manure additions. The figures for this nutrient, however, probably have the least significance so far as determining fertilizer application is concerned. This is due to the fact that a large part of the phosphoric acid applied to soils reacts with materials in the soil in such a way that it is "fixed" or absorbed and then is only very slowly available to the plant. Thus the amount of phosphoric acid applied must be large enough to take care of the soil's "fixing-power" and then leave some over for the plant. Liming helps the situation somewhat. On light sandy soils, fixation usually is much less than on heavy soils, and the use of comparatively large amounts of phosphoric acid over a period of years gradually fills the soil's hunger for phosphate, so that on sandy soils or on soils well fertilized with phosphate in the past, the phosphoric acid needed in the fertilizer tends to approach that given in the table. On the newer, and especially on heavy soils, relatively larger amounts of phosphoric acid must be used.

The natural soil supply, or additions in fertilizer or manure, also are the sources of potash for the crop. Since most of the potash in the soil is unavailable to plants, no attention need be paid to the total potash content so far as fertilizing any one crop is concerned. The available potash content of the soil is of great importance to the crop. If it is low, compared to the amount needed by the crop, more potash must be applied for optimum yield and quality of crop.

Sandy soils usually are low in potash.



**A big crop of celery removes more plant food from the soil than almost any other crop grown.**



**Cotton rust (left) is potash starvation. The cotton (right) received enough potash for vigorous growth.**

The heavy soils frequently are better supplied with this nutrient, but removal of potash by cropping without sufficient replacement by fertilizer and manure results in the depletion of the available potash even in those soils naturally well supplied. On some heavy soils, there will be "fixation" or absorption of potash whereby it is rendered unavailable to the immediate crop. This apparently is more common on heavy soils subject to alternate wetting and drying, and as in the case of phosphoric acid, enough potash must be applied to take care of the soil's "fixing" power and leave some over for the crop. This condition, however, is not as common in the case of potash as for phosphate. Peat and muck soils usually are very low in potash and require high potash applications, approaching the figures given in the table, for good crop growth.

It will be seen that in the table the figures for the nitrogen in the non-leguminous crops, and those for potash in all the crops, are the most important and significant from the fertilizer standpoint. However, the longer soils are farmed and the lighter the soil, the more fertilizer usage tends to approach the figures given for all three nutrients. This is exemplified in trends in fertilizer usage in various parts of North America. On the soils in the East, which have been farmed longer and which along the coastal regions frequently are sandier, fertilizers commonly used are in a 1:2:2 or 1:1:1 ratio while formerly they had a wider ratio, especially with respect to phosphoric acid. On the newer soils in the West, fertilizer ratios of 1:8:1 and 1:6:1 were common. With the longer farming of these soils, the fertilizer ratio is changing rapidly to 1:2:1, 1:4:4, and 1:2:2. In sections of Europe, where agriculture is still older than in any place in this country, fertilizer usage is commonly based entirely on the plant foods contained in the crop, with allowance made only for the nutrients contained in manure applied.

The figures on the nutrients contained in the crops as a whole and in the various parts of the plants can be used directly in determining how much plant food is removed from the soil with various yields. Higher or lower yields

will remove nutrients roughly in proportion to the variation in yield from that stated in the table. The data also show the importance of conserving as carefully as possible crop residues, straw, and other parts of the crop frequently not considered of much importance. When properly used, they have a high fertilizing value, and when wasted, represent a direct loss to the farmer.

When compiling the data for the table, numerous sources were consulted, a list of which is given at the end of the article. The excellent figures of Van Slyke were used more than any other single source, but they have been supplemented with those of various other authorities. Mr. E. K. Weathers kindly supplied information which permitted the calculation of nutrient contents of lespedeza on a pounds per acre basis, and Mr. F. E. Gladwin and Mr. A. Ulrich supplied additional data on grape analyses from their personal files.

So far as possible, the data have been taken for crops growing under representative conditions of climate, rainfall, and fertility. All of these factors influence markedly the nutrient content of the plant. Unpublished data at Purdue University, kindly made available for reference, show the variation that may occur when crops are grown with high or low levels of fertilization. For the present, those levels which give the optimum yields are considered most appropriate and therefore representative of the nutrient conditions under which the plant should be grown.

## Table I—Nutrient Content of Crops

| Crop | Yield | Part of Crop | N lb. | $P_2O_5$ lb. | $K_2O$ lb. | Total |
|---|---|---|---|---|---|---|
| Cotton | 500 lb. | lint | 38 | 18 | 14 | 70 |
| | 1,000 lb. | seed, burrs | | | | |
| | 1,500 lb. | leaves, stalks | 27 | 7 | 36 | 70 |
| | | Total | 65 | 25 | 50 | 140 |
| Tobacco | 1,500 lb. | leaves | 55 | 10 | 80 | 145 |
| | | stalks | 25 | 10 | 35 | 70 |
| | | Total | 80 | 20 | 115 | 215 |
| Corn | 60 bu. | grain | 57 | 23 | 15 | 95 |
| | 2 tons | stover | 38 | 12 | 55 | 105 |
| | | Total | 95 | 35 | 70 | 200 |
| Wheat | 30 bu. | grain | 35 | 16 | 9 | 60 |
| | 1.25 tons | straw | 15 | 4 | 21 | 40 |
| | | Total | 50 | 20 | 30 | 100 |
| Oats | 50 bu. | grain | 35 | 15 | 10 | 60 |
| | 1.25 tons | straw | 15 | 5 | 35 | 55 |
| | | Total | 50 | 20 | 45 | 115 |
| Barley | 40 bu. | grain | 35 | 15 | 10 | 60 |
| | 1 ton | straw | 15 | 5 | 30 | 50 |
| | | Total | 50 | 20 | 40 | 110 |
| Potatoes | 300 bu. | tubers | 65 | 25 | 115 | 205 |
| | | tops | 60 | 10 | 55 | 125 |
| | | Total | 125 | 35 | 170 | 330 |

| Crop | Yield | Part of Crop | N lb. | $P_2O_5$ lb. | $K_2O$ lb. | Total |
|---|---|---|---|---|---|---|
| Sweet Potatoes | 300 bu. | roots | 45 | 15 | 75 | 135 |
| | | vines | 30 | 5 | 40 | 75 |
| | | Total | 75 | 20 | 115 | 210 |
| Sugar Beets | 15 tons | roots | 55 | 22 | 53 | 130 |
| | | tops | 60 | 23 | 92 | 175 |
| | | Total | 115 | 45 | 145 | 305 |
| Tomatoes | 10 tons | fruit | 60 | 20 | 80 | 160 |
| | | vines | 40 | 15 | 95 | 150 |
| | | Total | 100 | 35 | 175 | 310 |
| Cabbage | 15 tons | all | 100 | 25 | 100 | 225 |
| Celery | 350 crates | all | 80 | 65 | 235 | 380 |
| Spinach | 9 tons or 1,000 bu. | all | 90 | 30 | 45 | 165 |
| Apples | 400 bu. | fruit | 20 | 7 | 30 | 57 |
| | | leaves, wood | 10 | 3 | 5 | 18 |
| | | Total | 30 | 10 | 35 | 75 |
| Peaches | 500 bu. | fruit | 30 | 15 | 55 | 100 |
| | | leaves, wood | 55 | 10 | 45 | 110 |
| | | Total | 85 | 25 | 100 | 210 |
| Grapes | 4 tons | fruit | 10 | 6 | 20 | 36 |
| | | leaves, canes | 15 | 4 | 15 | 34 |
| | | Total | 25 | 10 | 35 | 70 |
| Oranges | 600 boxes | fruit | 65 | 23 | 105 | 193 |
| | | leaves, wood | 25 | 7 | 25 | 57 |
| | | Total | 90 | 30 | 130 | 250 |
| Soy Beans | 25 bu. | grain | 110 | 35 | 40 | 185 |
| | 1.25 tons | straw | 15 | 5 | 20 | 40 |
| | | Total | 125 | 40 | 60 | 225 |
| Peanuts | 1 ton | nuts | 60 | 10 | 10 | 80 |
| | 3 tons | vines | 25 | 5 | 40 | 70 |
| | | Total | 85 | 15 | 50 | 150 |
| Pea Beans | 30 bu. | grain | 73 | 23 | 24 | 120 |
| | | straw | 22 | 7 | 31 | 60 |
| | | Total | 95 | 30 | 55 | 180 |
| Alfalfa | 3 tons | all | 140 | 35 | 135 | 310 |
| Sweet Clover | 5 tons | all | 185 | 45 | 165 | 395 |
| Red Clover | 2 tons | all | 80 | 20 | 70 | 170 |
| Lespedeza | 3 tons | all | 130 | 30 | 70 | 230 |
| Cow Peas | 2 tons | all | 125 | 25 | 90 | 240 |
| Timothy | 1.5 tons | all | 40 | 15 | 45 | 100 |

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# Fertilizing Tobacco For More Profit

(*From page* 15)

Moreover, we are forced to the conclusion that the yield is closely related to the amount of chemical fertilizers supplementing the manure. This has been demonstrated by a series of experiments on varied proportions of chemical fertilizers and manure.

The results of a new series of experiments inaugurated in 1934 indicate that the most economical formulae to obtain both satisfactory yields and quality would be 10 tons of manure combined with 1,000 lb. of chemical fertilizers of the formula 5-8-10 or preferably 5-8-13.

A mixture close to the formula 5-8-13 can be made by the following ingredients:

Nitrate of soda—340 lb.
Sulphate of ammonia—260 lb.
20% superphospate—870 lb.
Sulphate of potash—530 lb.

The following mixture would give us a fertilizer easy to prepare and close to the formula 5-8-10.

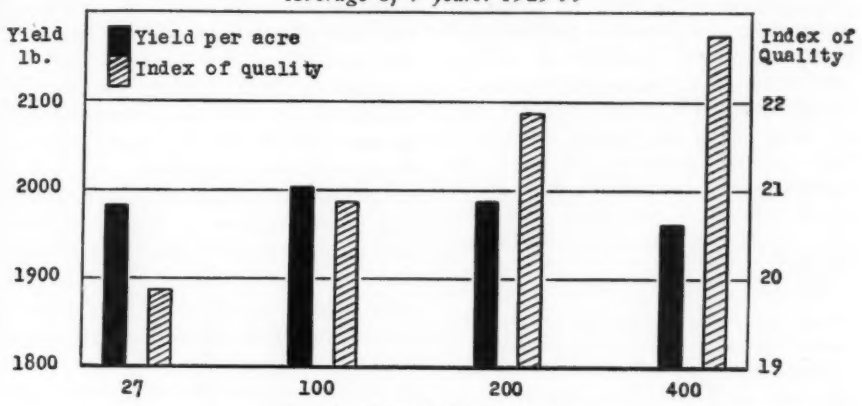
Nitrate of soda (200 lb.)—2 bags
Sulphate of ammonia (400 lb.)—2 bags
20% superphosphate (750 lb.)—6 bags
Sulphate of potash (400 lb.)—2 bags

We certainly prefer the first formula which contains more nitrate nitrogen and more potash.

The Province of Quebec produces nearly all of the binder cigar tobacco

## Influence of Potash on Yield and Quality of Cigar Tobacco

*Average of 5 years: 1929-33*




Pounds of potash ($K_2O$) per acre

Potash is to a great extent the quality producing element of tobacco. Increased applications of sulphate of potash always result in improved quality of the crop, but very slightly influence the yield.

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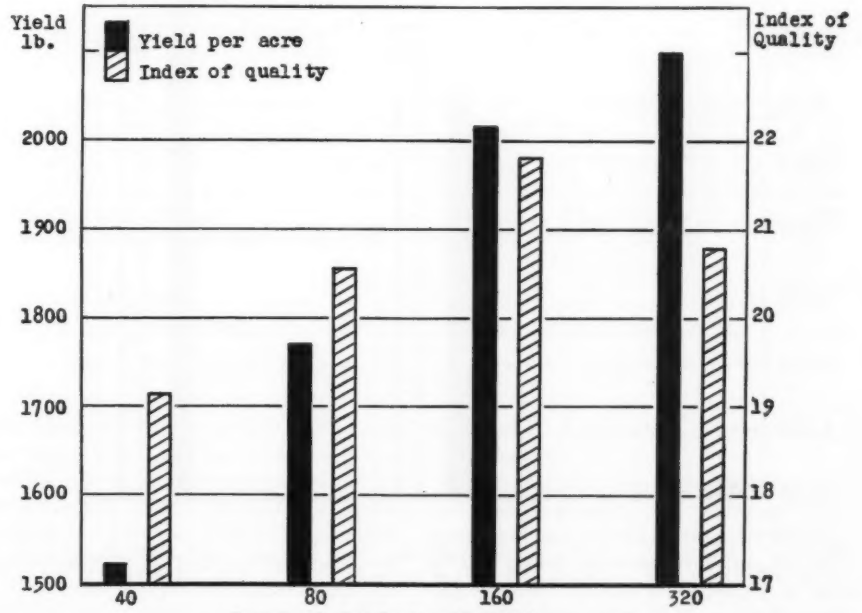
## Influence of Phosphoric Acid on Yield and Quality of Cigar Tobacco

*Average of 5 years: 1929-33*




Pounds of phosphoric acid ($P_2O_5$) per acre

Increasing the quantity of superphosphate increases the yield of tobacco. But heavy applications lower the quality of the crop.

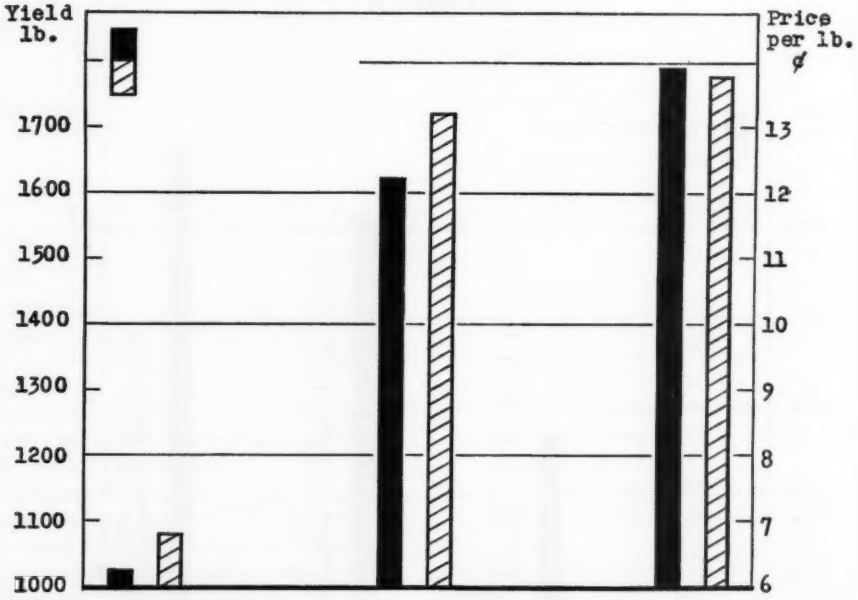
used in Canada. This market was won by improving the quality of the tobacco crops grown in Quebec. It is only by the exercise of vigilance in practicing all of the approved methods of tobacco production that this reputation can be maintained. We cannot run the risk of losing it by decreasing the use of high potash fertilizers, for such decreases would immediately show in the lower quality of our crop. This applies equally to our pipe tobacco production.

We have conducted only a few experiments on the fertilization of pipe tobacco. Results obtained so far seem to indicate that our domestic pipe tobacco requires about the same fertilizers as cigar tobacco. The quantities applied, however, should vary according to the size and yield of the varieties grown. For instance, an application of 500 to 600 lb. of chemical fertilizers combined with 8 to 10 tons of manure per acre will be sufficient for the production of Canelle or Petit Havane, while for Grand Rouge, 1,000 lb. of chemical fertilizers with 10 tons of manure will not be an excessive application.

For the last few years this station has conducted experiments on the production of cigarette tobacco, but it is only since 1938 that systematic experiments have been inaugurated on the fertilization of soils intended for the production of such tobacco. We would not care to make recommendations based only on 1 or 2 years of experimentation. On the other hand, as our cigarette tobacco

## Economical Use of Fertilizers

*Average of 3 years: 1934-36*

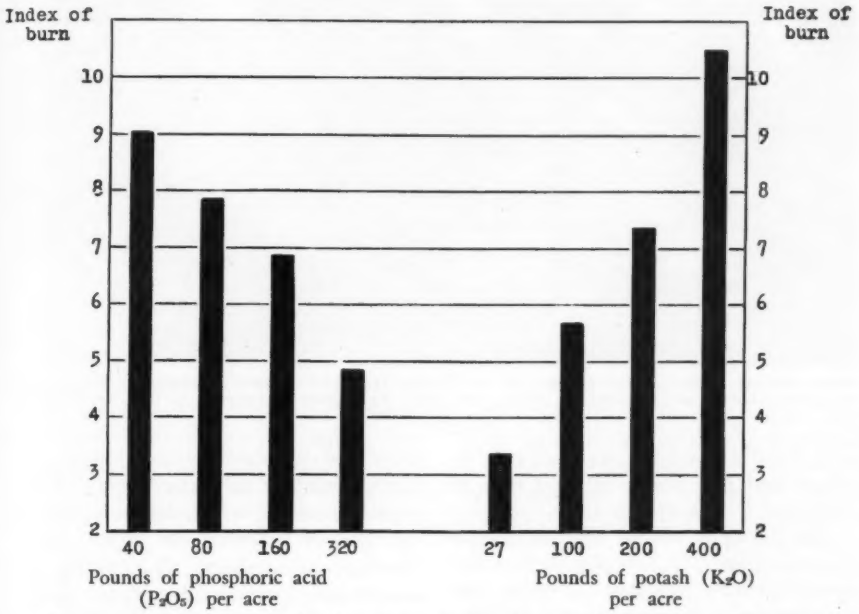



| Per acre | | | |
|---|---|---|---|
| Manure ..... | 0 | 20 tons | 10 tons |
| Chem. fer. .... | 0 | 0 | 1,000 lb. |
| Cost of fer..... | 0 | $40 | $32 |
| Gross return ... | $162 | $361 | $409 |

The cigar tobacco plantation must be well fertilized and the use of chemical fertilizers in combination with barnyard manure is more economical than manure alone.

## Influence of Phosphoric Acid and Potash on the Burn of Cigar Tobacco

*Average of 5 years: 1929-33*




Heavy applications of superphosphate lower the burning qualities of tobacco. The opposite is true for potash; each increase in the quantity of sulphate of potash in the fertilizer mixture results in better burning tobacco.

soils are rather similar to those used for the same crops in Ontario, we can without much hesitation follow the recommendations of the Delhi and Harrow Experimental Stations.

However, we must bear in mind that because of our short summer seasons and the lack of potash in our soils, an application of 700 to 800 lb. per acre of a fertilizer analysing 2-12-10 would probably be preferable to the use of 800 to 1,000 lb. of 2-10-8.

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# Utilizing Cut-overs In Mississippi

(*From page* 19)

the fall of 1938 and applied 500 pounds of basic slag per acre. During the winter the vetch furnished grazing for 250 head of sheep, 98 head of cattle, and 30 head of hogs. The cattle gained an average of 90 pounds per head, the sheep yielded 2 pounds more wool per head than similar sheep on open range, and the pigs weighed an average of 150 pounds by March 15, when they were sold. Livestock did not eat any of the peas.

This year the tung trees have made substantial growth, and although the tung crop was almost a complete failure in the county because of a late freeze, this orchard made a fair crop.

What a few acres in tung trees may mean to producers when suitable land is available is revealed in the experience

**Hand packing choice satsuma oranges on the Crosby farm at Picayune, Mississippi. The oranges have been cleaned and polished by rolling over revolving brushes and graded as they passed along on an endless belt.**

of J. V. Bilbo, who from his 2-acre orchard sold $77 worth of tung nuts in 1938 and $75 worth in 1939.

But farmers realize that crop production alone will not give them a balanced farming program. Timber production and cattle raising will continue basically important enterprises. Even if every acre of land suited for cultivation was put in crops, there would still remain thousands of acres fitted only for timber and permanent pastures. Fortunately, most of the land unsuited for cultivated crops is best adapted to trees and pastures.

Steps are being taken to increase the income from dairy cattle, beef cattle, hogs, poultry, and sheep, which last year totalled $310,805. A dairy herd improvement association has been organized. During the past 2 years more than 400 purebred Duroc Jersey gilts were placed on as many farms. Additional purebred beef bulls were bought for use in breeding up native cattle. Farmers throughout the county are establishing permanent pastures and increasing production of feed. They are seeding pastures to adapted grasses and clovers and applying needed commercial fertilizers which have more than doubled the carrying capacity of pastures.

Last year farmers of the county under the AAA program seeded 7,725 acres to soil-improving legumes, turned under 11,832 acres of green manure crops, built 3,587,180 feet of terraces, and put out 394 tons of superphosphate, for which they received soil-building payments.

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# First-Aid Squads

(*From page* 5)

doubt work better as a 4-H or Future Farmer project, if each family with membership in the club or chapter conducted the home surveys themselves and filed individual reports, which could be discussed by number in class or club meeting looking toward sound improvement practices.

Of course we are slowly making real progress toward safety education, and

in a small way also toward first aid. Some State legislatures have strict laws on school patrols and the ownership of approved first-aid kits, even in one-room buildings. Normal courses for many rural teachers require some working knowledge of first-aid principles, at least what not to do. Maryland has adopted and is pushing a special 4-H study and demonstration contest in safety and first aid. I believe Michigan has made real strides in that direction.

I know for one thing that we can do more for the cause through young people than in any other way. Recently I attended an evening short course held by a county agent and county nurse where in spite of bad winter roads and heavy snow, a large group of persons, mostly under twenty years, sat in rapt attention through a series of short talks on prevention of accidents and a demonstration by a trained Red Cross team. Questions were fired like a machine gun afterwards.

HOWEVER, most of us "missionaries" get so heated up that we overlook the limitations inherent in any public service. I know that more than half of the county extension agents and home demonstrators, as well as county nurses, are swamped with routine now and they cannot undertake each and every pet theory which some zealot totes into the court house.

We get into the habit of expecting government agencies to perform for us in every conceivable way, and then we are apt to lambast them for spending tax money afterwards. Hence reason prompts one to inquire whether the field of farm and home safety and first-aid training does not belong to the volunteer leadership and native talent existing among the rank and file. In a large sense it is just that kind of enthusiasm and talent which has built and maintained 4-H clubs and the better class of cooperatives and farm organizations. Given a goal that is not tainted with creed or political partyism, and which will yield to operation by common folks with reasonable success, we invariably note that such spontaneous movements live and grow amazingly.

We know for one thing that as a form of demonstration, the subject of first aid is vitally appealing. Anything which has both public welfare and the human body involved makes a demonstration far ahead of livestock judging or canning. Moreover, one can recite moving stories from real life, scenes that show how first aid and precautions at time of injury almost duplicated the miracles of the New Testament. Or conversely, how gross neglect and ignorance of first-aid detail have cost us more valuable and innocent lives in a year than Finland spent in her home defenses.

ANOTHER limitation often neglected in considering more trained rural first-aid teachers lies in the lack of time necessary for taking the official courses prescribed by such an agency as the Red Cross. And again, if we find a farmer with the time, he may not care to spend the fuel bills for going into town regularly during several days or weeks to complete both standard and lay instructor courses. It might be worth while for some local branches of powerful farm organizations, or even social clubs of a community kind, to help finance one or more capable leaders so they might become trained teachers of first aid in the home environment.

There are many public-spirited doctors residing in the rural districts of every State, who eagerly enter into plans for teaching and demonstrating first aid. They, with the considerate help of a State health department, might fix up a course of first aid to fit into situations where the Red Cross system cannot function to advantage.

Then again if some way could be found through donations to provide young candidates in 4-H clubs or otherwise with official Red Cross first-aid manuals, and then to fit into the final achievement plan by providing complete kits to a club or group after satisfactory attainment of first-aid lessons,

would it be a way to sharpen zest for a worthy objective?

This whole topic is one that is so likely to die by kindness that I wish somebody would kick it around awhile so as to start an argument. That is, I feel that everybody believes thoroughly in accident prevention and proper first aid to sufferers, but for lack of personal experience with the horrors of sudden calamity, many of us rub our hands in approval and dismiss them with a shrug. Some may even think that harping about this subject is as futile as to insist on the general improvement of a person's morals or behavior, and that it all begins at home where the slipper and the razor strap are easy to find and wield.

Yes, experience is the best teacher no doubt. But is it advisable to fracture and drown everybody into a state of preparedness and caution? And who wants to escort a lad into the woodshed after he has left a trap door open and tumbled out of a hay mow?

BEHIND all of our agricultural platforms of late has been the repeated demand for maintaining the integrity of the "family-size" farmstead. We shun the large and well-manned corporation affairs with efficient labor standards and ample protective devices. We cling with traditional zeal to the family unit as an independent cog in agriculture.

But such a platform always means a wide and constant use and dependence upon immature, youthful, and eager persons, or in a pinch, the women-folks go afield as well. Crowded by advancing seasons and pressed by overwork, many pitfalls are left gaping to catch the unwary in stable, feed yard, and field. Danger lurks nearer to the family-size farm than to the industrialized unit.

We have been proud to teach our juveniles of these family-size units how to bring young animals into the world well born, and how to care for them and attend to their minor ailments and injuries. As a nation we have lavished millions on money-making schemes and thrift devices involving everything from caponizing to making garments from flour sacks. We have held style shows and judging contests, and paraded our champion room renovators and bonnet decorators, our calf feeders and our bull-foot trimmers. All of which is wholesome and right and proper. But is it enough? Is it lopsided?

EVER since I beheld my first child on its mother's arm and thereafter watched it grow and develop, I have sort of come to regard the sanctity of the soul as somehow dependent on the defense of the human body. If in any way we can help to stave off blunders and relieve miseries which may come unheralded to diminish the usefulness of the body, I believe we are working for a kind of community and social welfare that transcends all material accomplishments.

No, I haven't any solution, have no answer to all who would ask what plans I have for training rural folks to become more proficient in self-protection and quicker to render emergency assistance to those in the clutches of calamity. That is a bigger job than any single fellow could hope to attempt.

They talk now of a renewal of war-like offensives and much bloodshed on the European front when spring arrives. A much surer and closer renewal of danger lies at hand on each and every farm with the rush of seeding, mowing, and threshing, and the hurry in the home incidental thereto.

And so in this final sentence I shoot out to you an earnest SOS—meaning "safety on the soil." We trust you will be able in some small way to contribute toward better local appreciation and organization of your friendly forces to attain that goal.

## PROPERLY SQUELCHED

Navy Bill had broken with his girl. After ignoring several letters requesting the return of her photograph, one came threatening to complain to the captain. Deciding to squelch her for all time, he borrowed all the pictures of girls available on the ship, sending them to her in a large bundle with the following note: "Pick yours out, I've forgotten what you look like."

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Hubby: "Darling, bad news. The doctor said he's going to remove my gallstones, my appendix, my tonsils, my—"

Wife: "Hold on. That's enough out of you!"

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Doctor Richard Hoffman, the eminent psychiatrist, swears he overheard this conversation on the subway:

"Ya' like t' read?"

"Ye'h."

"What'cha like t' read?"

"Oh, Lil' orphannanie, Popeye 'n' Flash Gordn'."

"Ya' like O. Henry?"

"Naw, de nuts git in me teeth."

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Politician: "What's public sentiment out here?"

Hiram: "Oh, just necking, petting, kissing and spooning; same as in other places."

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He: "Meet me at the Waldorf Astoria at eight."

She: "The Waldorf? Say, that's a nice place."

He: "Yeah, and it's close to where we're going, too."

## NOT VERY LONG

"How long yo' in jail fo', Mose?"

"Two weeks."

"What am de cha'ge?"

"Ain't no cha'ge, eberything am free."

"Ah mean, whut did yo' do?"

"Done shot ma wife."

"Shot yo' wife an' only in jail two weeks?"

"Dat's all, den I gets hung."

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Visitor (to hospital nurse): "Is Mr. Howard in?"

Nurse: "Yes, he's convalescing now."

Visitor: "Very well, I'll wait."

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"Poor Sarah; she landed in jail for having her dress on backwards."

"Why, they can't put her in jail for that."

"Ah, yes, but they did; it was her evening dress."

---

"What d'ya say, Jim, we get our wives together tonight and have a big time?"

"Okay by me, Joe, where'll we leave 'em?"

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Teacher: "Johnnie, what did you have for breakfast?"

Johnnie: "Teacher, I et six eggs."

Teacher: "Why, Johnnie! You should say 'ate.'"

Johnnie: "Well, maybe it was eight I et."

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Mandy: "At first it was love. He facinated me and I kissed him."

Liza: "Yeah, I know and then he began to unfacinate you—and you slapped him."

# FERTILIZER *Films* AVAILABLE

WE ARE NOW PREPARED TO LOAN without charge to agricultural colleges and experiment stations, county agricultural agents, vocational teachers, responsible farm organizations and members of the fertilizer trade, several films bearing on the proper use of fertilizers, particularly potash. *Distribution is being made from our respective branch offices as noted in the listing below, and anyone interested in showing these films should direct their requests to these offices.*

### Potash in Southern Agriculture

Covers fertilization and potash deficiency symptoms of cotton, tobacco, and corn in the various States of the South. Depicts experimental work now in progress at several Experiment Stations, also crops in the field, fertilizer placement work, and scenes in a fertilizer factory.

16 mm.—sound, color—running time 20 min.

Projectors will be loaned where necessary.

*Write to*—American Potash Institute, Inc., Mortgage Guarantee Building, Atlanta, Georgia.

### Potash From Soil to Plant

Covers testing soils to determine fertilizer needs, sampling of soils, potash deficiencies on prunes and grapes, also effects of fertilization on Ladino clover.

16 mm.—silent, color—running time 40 min. (on 1600 ft. reel).

*Write to*—American Potash Institute, Inc., Beans Building, San Jose, California.

### Bringing Citrus Quality to Market

Shows influence of fertilizers, particularly potash, on yield and quality of citrus fruit. Quality factors include thickness of rind, volume of juice, weight and general appearance of fruit.

16 mm.—silent, color—running time 25 min. (on 800 ft. reel).

*Write to*—American Potash Institute, Inc., Beans Building, San Jose, California.

### Machine Placement of Fertilizer

Covers methods of applying fertilizer to California orchards, lettuce, and sugar beets. Shows scenes of various types of apparatus devised by growers for applying fertilizer in orchards and on row crops.

16 mm.—silent, color—running time 15 min. (on 400 ft. reel).

*Write to*—American Potash Institute, Inc., Beans Building, San Jose, California.

### New Soils For Old

This film was prepared for the Department of Agronomy, University of Illinois. Deals with the experimental work on Illinois Soil Experiment Fields and stresses the benefits from a balanced soil fertility program using limestone, phosphates, and potash in growing corn, wheat, clover, and other crops.

16 mm.—silent, color—running time 40 min.

*Write to*—American Potash Institute, Inc., Life Building, Lafayette, Indiana.

### Fertilizers Improve Midwest Crops

Shows effects of proper fertilization on the growth of corn, wheat, alfalfa, and other crops in Illinois, Indiana, and Iowa. Includes potash, phosphorus, and nitrogen starvation symptoms and their confirmation by chemical tissue tests.

16 mm.—silent, color—running time 40 min.

*Write to*—American Potash Institute, Inc., Life Building, Lafayette, Indiana.

Requests for these films should include information as to group before which they are to be shown, date of exhibition, and period of time of loan.

**AMERICAN POTASH INSTITUTE, INC.**

**Investment Building** **Washington, D. C.**